XLVII, No. 2 FEBRUARY, 1952

VETERINARY MEDICINE

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features in this issue...

Rush Intramedullary Fixation of Long Bones as Applied to Veterinary Surgery

A Comparison of the ABR, Capillary Tube, Milk Whey and Blood Serum Agglutination Tests

The Use of Ephedrine and Antibiotics in the Treatment of Acute Mastitis of Sheep and Cattle

Two Outbreaks of Hepatic Cirrhosis in Swine in California, with Evidence Incriminating the Tarweed, *Amsinckia intermedia*

Antibiotic Agents in Small Animal Practice

Check List of Parasites of Domestic Animals Reported in Georgia

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Rush Intramedullary Fixation Of Long Bones As Applied To Veterinary Surgery

J. P. CARNEY, D.V.M., Meridian, Mississippi

MEDULLARY fixation of long bones is now widely practiced by veterinary surgeons. Some of the principles involved in this type of fracture reduction, however, are not generally known nor appreciated. The purpose of this article is to acquaint the reader with the Rush medullary pin and its practical application. The method offers a dynamic type fixation for a wide variety of fractures. It is superior to and overcomes many shortcomings of other methods.

Interest in the principle of fixation of fracture by use of pins fitted into the medullary canals of long bones was first aroused by news stories. These featured as a medical mystery, the finding of a long bar or nail in the femur of an American soldier returned from Germany. The principle had been advocated in American literature several years previously (*Am. Jour. Surg.*, 38:332, 1937).

In 1946, Leslie V. Rush, M.D., and H. Lowry Rush, M.D., of Meridian, Miss., developed the present Rush pin after extensive trials dating back to 1936. The improved device has gained international recognition by orthopedic surgeons, and is being used with gratifying results. Fractured fragments are held in anatomical alignment and, at the same time, active movement is allowed in joints immediately below and above the fracture site. Experience of two years' duration has demonstrated the value of the Rush pin in small animal practice; also, in one case involving a weight-bearing, long bone fracture in a cow.

Features of the Rush Pin

The pin is a round, non-corrosive, stainless steel rod (type 316SS), available in four diameters of various lengths. Its special features are a curved, sled-runner-like point and a hooked head which faces in the same direction as the slightly curved point. The point guides the pin down the canal without displacement of contents, and the head, when fitted over the cortex of the bone at the point of entry, prevents migration. When properly applied, three-point pressure is exerted by counter force, securing fixation by a spring principle that allows muscular compression of the fragments after alignment. This tends to give solidity and, at the same time, enhances union. The nail is relatively inert when implanted in body tissue.

Principle advantages of the Rush pin may be enumerated as follows:

1. Removal of the pin after adequate healing is optional.
2. Introduction of the pin from the sides, as well as from either end of the bone, is practical.
3. It makes possible adequate fixation of fractures near joints.
4. The hooked head of pin is designed to prevent migration into and out of the bone, and facilitates ease in removal if desired.
5. The sled-runner point simplifies introduction of the pin into the medullary canal.
6. Three-point pressure exerted within the medullary canal prevents displacement or rotation.
7. Fixation utilizes normal longitudinal muscle pull.
8. Versatility. It is useful in all long bones.
9. No complicated nor expensive instruments are required for application or removal.
10. The pin provides secure fixation without necessity for impacting with large bars.

Recommended General Procedures

Before attempting medullary fixation, several factors must be considered. Preoperative *x*-ray pictures are a necessary aid in determining the type and location of the fracture, as well as the size and shape of the medullary canal. Technics to be used vary and must be decided upon from a careful study of the individual case. The site and nature of the fracture determine whether a pin shall be introduced from the distal or proximal end of the bone, and whether the use of more than one is advisable. From personal experience, it has been concluded that fractures located in the distal third of the bone, fractures near the joints, and bones with unusually large medullary canals generally require two pins, while most others need only one. When two are

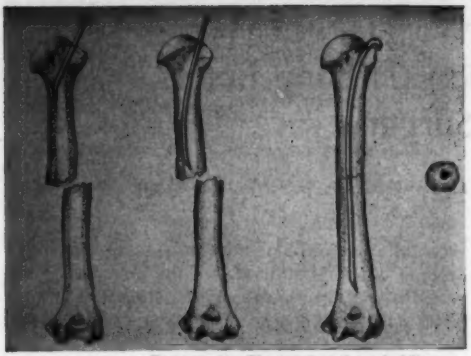

Photo courtesy The American Journal of Surgery

Diagrammatic drawing illustrating how the sled-runner point aids in directing the pin down the medullary canal of a long bone. Note position of pin in respect to the cortex as viewed on saggital plane.

needed, they are customarily introduced from opposite surfaces of the same extremity of the bone and tapped simultaneously into position.

The usual sterile surgical technics must be employed. The limb involved should be shaved, cleaned, and disinfected, and properly shrouded. The animal and shrouds should be placed in such position that *x*-ray pictures can be made during the operation without contaminating the surgical field. Pentobarbital sodium by intravenous injection is a satisfactory anesthetic.

Blind Nailing Technic

In some cases, such as fractures involving the tibia or where muscle covering is not heavy, open reduction is unnecessary. Simple fractures may be reduced by the so-called blind-nailing technic, aligning fragments by exterior palpation. In such cases, a small stab wound at the site selected for introducing the pin is made. This may be on either extremity or along the side either above or below the fracture. Selection is made based on location of the fracture, its type, or other features revealed by palpation and *x*-ray examination. A hole, the same size as the pin, is drilled into the medullary canal. By placing the drill point at a right angle to the bone, and using half turns of the drill-bit, rather than complete revolutions, an opening can be made without entangling overlying soft tissue.

As soon as the drill has penetrated the cortex of the bone, the direction is changed so that it is directed at an oblique angle to the long axis of the bone. This allows the sled-runner point of the pin, upon insertion, to strike the opposite cortex and slide along its surface as it is gently tapped into position. It is practically never necessary to exert great force in driving the pin. When difficulty is encountered, there will usually be determined some mechanical obstruction, not to be overcome by hard driving with the mallet. It is not impossible to drive the pin through the cortex of the bone opposite the drill hole but extremely unlikely if the opening is sufficiently oblique. Callus from previous injury might obstruct normal passage of the pin. When abnormal resistance is met, grasp the hooked proximal end with a pair of pliers, withdraw an inch or more and rotate a few degrees in either direction. This will change the direction of the point. Tap gently into position. If too long or too large a pin has been selected, it may be withdrawn and another inserted. After crossing the fracture site, an *x*-ray picture should be made to check the position of the pin. If it is evident that the pin is in position and the fracture properly aligned, the pin is driven on down the shaft. A small punch is used to engage its hooked head snugly about the cortex of the bone. A final *x*-ray plate is made before closing the wound.

Pinning with Open Reduction

In cases where heavy muscle is found overlying the fracture or in compound and comminuted fractures, open reduction is recommended. Procedures are the same as outlined for the blind technic except that an incision is made over the fracture site. This permits manipulation of the fragmented ends of the bone when traction is applied to the limb. At this time, bone fragments can be removed or secured in position by encircling stainless steel wire. In comminuted fractures, the use of circular wires in connection with pins affords almost perfect reconstruction of bones. In closing the surgical wound, the periosteum should be properly restored and dead space avoided by accurately closing all the fascial planes.

It is wise to bandage the entire limb with an elastic-type gauze to prevent swelling. Postoperative injections of penicillin are given to avoid possible infection. Necessary hospitalization period is comparatively short but care should be exercised in the amount of weight-bearing allowed until firm callus is assured.

Illustrated Cases

Case 1. A Pointer, approximately one year of age, was admitted to the hospital on July 12, 1950, because of multiple fractures of the

left hind leg resulting when the dog jumped from a moving car.

X-ray plates made possible diagnosis of an oblique supracondylar fracture of the left femur and comminuted fracture at the junction of the middle and lower third of the left tibia and fracture of the left fibula. (Fig. 1)

Under intravenous pentobarbital anesthesia, open reduction was performed over both fracture sites.

Bilateral incisions were made beginning at the condyle at the distal extremity of the femur and entering upward slightly below the fracture site. Two Rush pins were chosen for fixation, one being 2/16″ in diameter and the other 3/32″ in diameter.

A vertical drill hole was made just above the condyle on each side of the bone. These were the same diameter as those of the pins chosen. As soon as the drill had penetrated the cortex of the bone, the direction was changed so that the drill pointed obliquely upward.

Through these drill holes, the medullary pins selected were introduced simultaneously, one on either side, and driven upward with a mallet so that the points followed the medullary canal; by manipulation the fracture was then realigned. By tapping the pins alternately, they were driven well up into the medullary

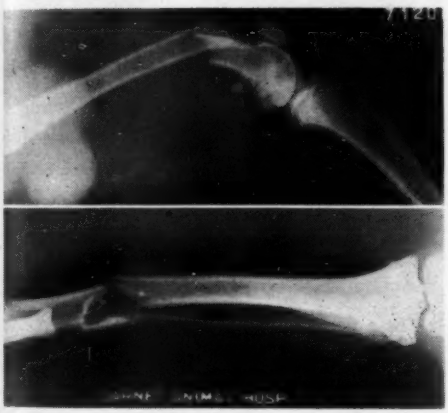

Fig. 1. Case 1. Oblique supracondylar fracture of the left femur (top) and comminuted fracture at the junction of the middle and lower third of the left tibia and fibula (bottom).

canal of the proximal fragment. It was then evident that the fracture had been accurately and securely transfixed. By means of a small punch, the heads were tapped so that the hook engaged snugly against the cortex of the bone. The wounds were closed with interrupted 00 chromic catgut and cotton sutures. (Fig. 2.)

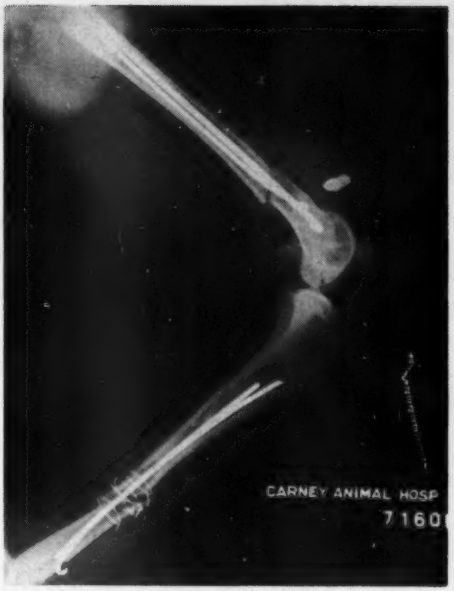

Fig. 2. Case 1. View of reduction effected by two Rush pins in each bone, inserted through opposite surfaces. Encircling stainless steel wire secures loose fragment in position.

The fibula fracture was ignored. Through anterior and medial incisions, suitable drill holes were made on either side near the distal end of the tibia. Caution was used in obtaining sufficient obliquity in the drill holes. The pin took the normal curve of the canal by its spring temper as driven. After the bones were realigned by grasping with the fingers, the two pins were driven simultaneously upward into the proximal fragment. Encircling stainless steel wires were used, as noted, to secure small comminuted fragments in position. (Fig. 2.)

In the fracture of the femur, two pins were used through necessity to secure adequate fixation. In the tibia the same technic was used, but a single, longer pin of larger diameter might have been driven from the upper end of the tibia downward to better advantage.

The patient was given adequate chemotherapy. There was no evidence of infection and healing progressed uninterruptedly. The dog engaged in partial weight-bearing almost immediately after the operation. He appeared to bear full weight on the leg in a period of two weeks. He was discharged from the hospital 12 days after the operation. No postoperative care was given after dismissal, and in two months healing appeared complete. (Fig. 3.)

Fig. 3. Case 1. View of callus two months post-operative.

Case 2. A Spitz, four years of age, was presented on January 3, 1951, having suffered a subtrochanteric fracture of the left femur, with the usual displacement of the upper fragment (abduction, external rotation, and overlapping). (Fig. 4.) Open reduction was performed. Drill hole was made in the superior lateral surface of the great trochanter. Through this drill opening, a Rush pin, 2/16" in diameter and sufficiently long so that it might be inserted through almost the entire length of the femur, was introduced. The pin was used to rotate the upper fragment into position; and when the bone was properly reconstructed, the pin was tapped across the fracture hiatus and into the canal of the distal fragment. This operation resulted in practical reconstruction with rigid fixation. The wound was closed with interrupted 00 chromic catgut for the fascia and cotton suture for the skin. No external immobilization appliance was used. This patient was discharged from the hospital the day following surgery, at which time he was bearing partial weight. Healing was rapid and uninterrupted.

Fig. 4. Case 2. Transerve subtrochanteric fracture of the left femur with displacement and overlapping.

Six days after surgery the dog was walking on the leg; and at intervals would run, jump, and stand on both his hind legs. After six weeks, union was considered complete. (Fig. 5.)

Fig. 5. Case 2. Reduction effected by one pin inserted through hole drilled into the superior lateral surface of the great trochanter. Recovery excellent.

Discussion

These two cases illustrate adaptability of the Rush pin to fractures in small animals. In neither case is removal of the pins anticipated. The smooth hooked end does not traumatize tissue. However, if at any time removal is desired, the pins can easily be retracted by means of a pliers, or chisel and mallet applied to the hooked head through a small incision.

In the simplicity of application and the stability resulting from its spring principle and three-point pressure fixation lie the greatest advantages of the use of the Rush pin. Introduction, particularly from the side of the bone, is facilitated by the sled-runner point which follows bone curvature like a toboggan sled.

The temper of the metal is such that the pin is malleable enough to take a curve to enter the bone and resilient enough to realign itself within the bone following gutters on the surface of the medullary canal. This not only prevents the bone from being displaced by the natural muscle pull of the extremity, but utilizes the muscle pull to obtain a firm and secure fixation.

The hooked head is useful not only for guiding the pin but also for snugly fixing it against the cortex of the bone in such fashion that it does not produce irritation to overlying soft tissues. It prevents the pin from migrating into the bone and helps to prevent it from migrating out of the bone. It also helps to control rotation.

Conclusion

1. Medullary fixation simplifies reduction of fractures of long bones in small animals and possesses potentialities for us in large animals.
2. The Rush medullary pin appears to be simpler, more efficient, and far more versatile than other methods of medullary fixation.
3. There is no need for special types of equipment for insertion or removal, nor for any appliance designed for external immobilization.

▼ ▼ ▼

Highlights of the Nebraska Meeting

The 55th annual meeting of the Nebraska Veterinary Medical Association was held at the Cornhusker Hotel at Lincoln, December 5-7, 1951. Approximately 250 veterinarians registered for the sessions and over 400 persons attended the banquet.

Highlighting the three-day meeting were two forum discussions. The cattle forum was conducted by Dr. S. W. Phillips, David City, Neb., assisted by a number of Nebraska practitioners, with the guest speaker for the occasion, Dr. D. R. Mackey, Greeley, Colo. Considerable attention was given to the subject of shipping fever. Generally, recommended treatment was the administration of high antibiotic dosages; particularly penicillin in oil, in 3,000,000 unit doses; streptomycin, parenteral sulfonamides, with supplementary antiserum for best results. A number of other common cattle problems were presented by speakers on the panel and from the floor. Doctor Mackey stated that treatment of foot-rot with sodium sulfapyridine solution was not producing the favorable results initially reported.

The hog forum was conducted by Dr. A. V. Brunke of Plainview, Neb. On the panel were practitioners from Iowa and Nebraska and as guest speaker, Dr. Carl Schroeder, Pearl River, N. Y. The time allotted was given largely to discussion of the new lapinized hog cholera vaccines. Dr. E. P. Anderson, state veterinarian, commented that the use of the new vaccines is at present prohibited in the state. He advised that any positive evidence of their use in Nebraska be reported and indicated that he was confident the state authorities would support the present state laws.

Col. Wayne O. Kester, chief of the Veterinary Service, U. S. Air Force, detailed the studies now in progress on defense against biological warfare. He stated that the answer to the problem from the veterinary angle is just good, preventive medicine.

Elected to serve the Association on the Executive Committee for the ensuing year were Dr. E. W. Peck, Auburn, promoted to president, succeeding Dr. O. E. Walgren, Platte Center; Dr. F. O. Lundberg, Wausa, vice-president; and Dr. Ordella Geisler, Lincoln, re-elected secretary-treasurer.

▼ ▼ ▼

Addition of antibiotic feeding supplements to the ration of poults resulted in a growth response up to eight weeks of age, according to report of Branion and Hill. (*Poultry Sci.*, 30:796 [Nov.], 1951). Feed efficiency was not improved when animal proteins were included in the diet, though significant improvement in utilization of feed was apparent in birds receiving an all-plant protein supplement.

▼ ▼ ▼

Off flavors may be noticeable in eggs washed in solutions containing soap.

A Comparison Of The ABR, Capillary Tube, Milk Whey And Blood Serum Agglutination Tests*

E. V. MORSE,† D.V.M., M.S., Ph.D., EDITH SMITH,†† R.N., and ELEANOR SCHMIDT,†† B.S., M.S., Madison, Wisconsin

THE Abortus Bang Ringprobe (ABR) or milk ring test was devised by Fleischhauer in 1937[1]. Since then, it has been widely studied and used in Denmark[2]. Roepke and associates[3,4] have reported on its use in the Minnesota bovine brucellosis eradication program. The test is either under study or being used in brucellosis control work in Wisconsin, Ohio, Iowa, Michigan, North Dakota, Maryland, South Carolina, North Carolina, Alabama, California, Florida, Nevada, New Jersey, New York, Oregon, Pennsylvania, West Virginia and Illinois[5].

King[6] recently completed a comparative study of the ring test, serum agglutination test, and a capillary tube milk test devised by him. The capillary tube test has an advantage over the ABR because it may be conducted on samples of skim and homogenized milk. Small glass capillary tubes, 0.8 mm. by approximately 4 in., are used. The milk and then a small amount of ABR antigen are drawn into the tubes by capillary action. The tubes are inverted, placed at a 45 degree angle in plasticine (modeling clay), allowed to stand for 30 minutes at room temperature, and read. A positive reaction is characterized by the antigen agglutinating in clumps along the column of milk. In markedly strong reactions, the milk may be white at the end of the incubation period; that which does not contain Brucella agglutinins remains a homogenous blue-violet color and a clumping of antigen is not observed.

This investigation includes a comparative study of the ABR, capillary tube test, milk whey test, and serum agglutination test results. The milk also was subjected to various physical factors to determine the effect upon the ABR and capillary tube test.

Materials and Methods

Milk of udder quarter samples and blood serum samples were collected from both reactor and non-reactor cows of an experimental Brucella-infected herd of the Veterinary Science Department of the University of Wisconsin. Unless otherwise stated, it was tested within six hours after it was drawn.

The ABR was conducted and evaluated according to the procedures recommended by Roepke, *et al.*,[3] with the exception of the following: 1 ml. samples were used and the tests were incubated at 37 C. for 50 minutes.

King's recommendations were followed in detail using the capillary tube test. His procedures are well outlined[6].

The antigen‡ (lot number 31,731) used in both the ABR and capillary tube test was prepared by the Bureau of Animal Industry, Beltsville, Md.

Blood serum agglutination tests were conducted using twofold serial dilutions beginning at 1:25. The concentrated *Brucella abortus* tube antigen was supplied by the USDA and was diluted according to directions. Tests were incubated for 48 hours at 37 C. prior to reading.

Two hundred and forty-three quarter samples of milk were drawn from 63 cows whose sera contained Brucella agglutinins ranging from a 1:25 to above 1:400 titer. Twofold serial dilutions starting at 1:2 were made of the samples which did not contain Brucella agglutinins. The ring and capillary tube tests were conducted on the undiluted and the serially diluted samples. The highest dilution showing any degree of reactivity was considered the endpoint.

---

*From the Department of Veterinary Science, University of Wisconsin, Madison. Project 691.

Published with the approval of the Director of the Wisconsin Agricultural Experiment Station, Madison.

†Assistant Professor, ††Research Assistant, Department of Veterinary Science, College of Agriculture, University of Wisconsin, Madison.

‡Kindly furnished by Dr. W. R. Winner, U. S. Department of Agriculture, Bureau of Animal Industry, Madison, Wisconsin.

The whey agglutination, ABR and capillary tube tests were conducted on specimens using the twofold serial dilution technic. All the cows providing milk for testing were considered to be Brucella-infected on the basis of the serum agglutination test. Milk of 11 cows, or 42 quarter samples, was tested.

A study was made of the effect of freezing and aging upon the results obtained with the ring and capillary tube tests. The usual serial dilutions were made with negative milk and the specimens were tested by both methods prior to the freezing treatment or storage. The dilution to alter the status of a negative or clean herd. Suspects, or cows which had an incomplete serum agglutination test reaction at 1:100, did not appear on the basis of milk test findings to alter the status of a negative herd. A similar situation prevailed with the specimens of reactors which were positive at a 1:100 dilution by the serum agglutination test. Approximately 50% of the milk samples from the 1:200 serum test reactors were negative on both milk tests. In general, positive tests were not observed above the 1:8 milk dilution level. The median positive ABR or capillary test

TABLE 1. Comparison of the Results of the Blood Serum Agglutination, ABR and Capillary Tube Test upon Serum Samples from 63 Cows and Milk from 243 Udder Quarters

No. of Cows	Reading of Blood Serum Tube Agglutination Test	% Agreement Between ABR and Capillary Test	Results of Serial Dilution Technic* on Udder Quarter Samples				
				Number Negative Samples	Number Positive Samples	Lowest Dilution Positive	Median Dilution Positive	Highest Dilution Positive
8	1:25 through at 1:50 P†	74.19	ABR:	20	11	0**	0	1:4
			CAP:	18	13	0	0	1:4
10	1:50	80.0	ABR:	34	6	0	0	0
			CAP:	31	9	0	0	1:2
10	1:100 P†	50.0	ABR:	22	16	0	0	1:8
			CAP:	20	18	0	0	1:2
7	1:100	60.0	ABR:	15	10	0	1:2	1:16
			CAP:	14	11	0	0	1:4
14	1:200	48.21	ABR:	24	32	0	1:2	1:64
			CAP:	21	35	0	1:2	1:32
4	1:400	46.67	ABR:	none	15	0	1:2	1:64
			CAP:	none	15	1:2	1:2	1:128
10	above 1:400	28.94	ABR:	none	38	1:8	1:128	1:1024
			CAP:	none	38	1:16	1:128	1:1024

Average: 55.1%

*Twofold dilutions of the sample with negative milk starting at 1:2.

**Represents undiluted sample.

†Partial or incomplete agglutination.

ent milk was kept under the same conditions as the samples. Forty-eight samples were frozen for five hours at —40 C.; 36 were kept at that temperature for three days; and 39 were placed outdoors for three days during which time the temperature ranged from 29 F. to 50 F. At the end of the stated intervals, the milk was thawed and tested by the ABR and capillary tube test methods. The pH was determined prior to and after treatment, using a Coleman pH electrometer.

Results

The ABR and capillary tube test reaction for milk from cows which had sera agglutinin titers of 1:25 to 1:50 were positive at such low dilution that the milk agglutinins, it appeared, would not be present in sufficient concentra-

result for the milk of cows with serum titers of 1:200 or below was the "O" tube dilution or the undiluted milk sample itself. All the samples from 1:400 serum agglutination reactors were positive to both milk tests. The median reaction was "O" for the ABR and 1:2 for the capillary test. Reactions were observed above the 1:4 dilution with all samples from cows which were positive to the serum test in serum dilutions above 1:400, and a median of 1:128 was noted.

Agreement in titer of the ABR and capillary test was obtained with 55.1% of the 243 samples. The ring and capillary test readings were considered to agree when they were negative with undiluted milk and when both were positive to any degree at the same tube dilution. These data are compiled in table 1.

When the milk of infected cattle, which was rich in brucella agglutinins, was subjected to the ABR and the capillary tube and whey agglutination tests, the titer agreement was closest between the capillary tube test and the whey test. A 26.1% agreement at the same tube dilution was observed between the ring and capillary tests, while a 64.3% agreement was observed between the two tests if a one tube difference was included as being in agreement. The capillary tube test frequently reacted a dilution of one tube higher than the ring test. These results are summarized in table 2.

TABLE 2. A. Agreement of ABR and Capillary Tube Milk Test with the Milk Whey Agglutination Test Results*

	ABR Results	Capillary Results
Titer same as whey	3	8
Titer 1 tube dil. above whey	1	4
Titer 1 tube dil. below whey	6	16
Titer 2 or more dil. above whey	1	1
Titer 2 or more dil. below whey	31	13

B. Correlation of ABR With Capillary Test Results*

Complete agreement	11
Cap. test tit. 1 tube dil. above ABR titer	15
" " " 1 tube dil. below ABR titer	1
" " " 2 tube dil. above ABR titer	8
" " " 2 tube dil. below ABR titer	0
" " " 3 tube dil. above ABR titer	5
" " " 3 tube dil. below ABR titer	0
" " " 4 tube dil. above ABR titer	2
" " " 4 tube dil. below ABR titer	0

*Milk samples of 11 Brucella-infected cows; 42 udder quarter samples tested. Twofold serial dilutions with "Brucella agglutinin free" milk used, starting at 1:2.

The agreement, within two successive tube dilutions between the ABR and capillary tube test prior to the freezing or aging of the samples was 91.6, 97.2 and 89.7% for the five hours at —40 C., three days at —40 C. and three days outdoors at 29-50 F., respectively. After being frozen for five hours, the samples had an 85.4% ABR-capillary tube test agreement. A 72.2% correlation was observed between the two tests after the samples had been frozen for three days. Nine of the specimens could not be read because the prolonged freezing had altered the cream-rising characteristics of the milk. This alteration did not appear to influence the capillary test reaction. The ABR-capillary test agreement between the ABR prior to treatment and the ABR after treatment for freezing for five hours, three days, and outside storage for three days was 89.6, 69.4 and 89.7, respectively. The pretreatment and post-treatment capillary agreement was 95.8, 97.2 and 92.3%. The capillary test results were least affected by freezing and aging. Results are recorded in tables 3 and 4. There was very little change in the pH and the resultant changes were not sufficient to indicate that the increased acidity or alkalinity influenced the results of the two tests appreciably.

Discussion

The ring and capillary tube tests of milk were in agreement in 55.1% of 243 tests. Closer agreement was obtained with samples from cows that reacted to the serum agglutination test for brucellosis at 1:25-1:50 dilutions. The two milk tests, under field conditions, would agree with the blood test results since weak reactions of the quarter samples of milk were eliminated by the dilution with negative milk as the cans are filled at the farm and by the further dilution when two or more can samples are combined to form the composite test specimen. Animals with 1:100-1:200 serum titers would be missed by both of the milk tests. This situation apparently exists when the two are used in testing programs, for a high percentage of suspect herds are overlooked[7].

TABLE 3. Effect of Freezing and Aging upon the Agreement of the ABR and Capillary Tube Test†

BEFORE TREATMENT	Sample Groups A	B	C
Complete agreement	39	17	21
1 Tube dil. disagree.	5	18	14
2 Tube dil. disagree.	4	1	3
3 Tube dil. disagree.	0	0	0
>3 Tube dil. disagree.	0	0	1
AFTER TREATMENT			
Complete agreement	22*	18**	13***
1 Tube dil. disagree.	19	8	25
2 Tube dil. disagree.	5	0	1
3 Tube dil. disagree.	1	1	0
>3 Tube dil. disagree.	1	0	0
ABR creamline unfit to read	0	9	0
Total number of quarter samples	48	36	39
Number of cows	12	9	10

†Twofold serial dilutions made with negative milk starting at the 1:2 dilution.
*Samples and diluent milk stored for 5 hr. at —40 C.
**Samples and diluent milk stored for 3 da. at —40 C.
***Samples and diluent milk stored for 3 da. outdoors at 29 to 50 F.

Cows which have 1:400 or greater serum agglutination titers are easily detected by either the ABR or capillary tube test. When several

such animals are present in a herd, there is apparently little difficulty in detecting that herd as an infected one. The capillary tube test appears to be more sensitive and specific than does the ring test when the two are compared with the whey agglutination test. Moore[6]

TABLE 4. Agreement of ABR Results Prior to Storage with ABR Results after Storage†

	Sample Groups		
	A*	B**	C***
Complete agreement	30	13	23
1 Tube dil. above initial read.	11	5	9
1 Tube dil. below initial read.	2	7	3
2 Tube dil. above initial read.	2	0	2
2 Tube dil. below initial read.	1	1	2
3 Tube dil. above initial read.	0	0	0
3 Tube dil. below initial read.	1	0	0
> 3 Tube dil. above initial read.	1	1	0
> 3 Tube dil. below initial read.	0	0	0
Creamline unfit to read	0	9	0

Agreement of Capillary Test Prior to Storage with Capillary Test after Storage

Complete agreement	36	23	15
1 Tube dil. above initial read.	10	7	17
1 Tube dil. below initial read.	2	5	4
2 Tube dil. above initial read.	0	1	3
2 Tube dil. below initial read.	0	0	0
Total number of quarter samples	48	36	39
Number of cows	12	9	10

†Twofold serial dilutions made with negative milk starting at the 1:2 dilution.
*Samples and diluent milk stored for 5 hr. at —40 C.
**Samples and diluent milk stored for 3 da. at —40 C.
***Samples and diluent milk stored for 3 da. outdoors at 29 to 50 F.

reported that the ABR endpoint of a tube dilution basis was often one or more tubes higher than that of the whey agglutination test. However, the data obtained from our experiments indicate that the opposite situation may exist. It must be recognized that the samples used for ABR, capillary tube test, whey and serum agglutination test comparisons in this work were obtained from infected cows which had high serum and whey titers.

Freezing affects the results of the two tests. Nine of 36 ABR test samples could not be read because the fat did not rise satisfactorily. The same samples, however, were readily evaluated by the capillary tube method. The reactions after freezing, if they differed from those prior to freezing, were generally positive at a one tube higher dilution. Roepke and coworkers[4] have reported that the ABR results on frozen samples may appear at 1+ or even 2+ reactions when the initial tests were negative. Likewise, the aging increased the positivity of the ABR and capillary test reactions in some instances.

Summary

A comparison of the ABR, the capillary tube, the whey agglutination, and the serum agglutination tests was conducted upon individual milk and serum samples from cows in a large, experimentally infected herd. The capillary tube test appeared to be more sensitive than the ring test and was in closer agreement with the whey agglutination test than the ring test. The ABR and the capillary test were in closest agreement with one another and with the blood test in analyses of udder quarter samples of milk from cows which had blood serum agglutination titers ranging from 1:25-1:50.

The ABR-capillary test correlation was less close on the milk from cows classed as suspect or low reactors. However, among animals with serum agglutinin titers in the 1:400 or higher range the several milk tests agreed well with the blood serum test. Freezing and aging of milk appeared to increase the positivity of some samples in the ABR and the capillary tube test reactions. It appears that the capillary tube test may be substituted to advantage for the ring test in milk testing programs. However, milk samples which give 1+ or 2+ ABR reactions do require careful scrutiny for accurate reading[5] when the capillary test is used. Use of either the ABR or capillary tube test as an unqualified substitute for either the whey or serum agglutination tests cannot be recommended on the basis of accumulated knowledge.

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(*Continued on page 80*)

The Use Of Ephedrine And Antibiotics In The Treatment Of Acute Mastitis Of Sheep And Cattle†

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THE efficiency of some of the new chemicals and antibiotics in the treatment of mastitis is extremely high in the destruction or stasis of bacteria in infectious conditions. Another aspect, however, particularly in sheep, involves the treatment of acute swelling and active congestion. These case studies are concerned with this latter problem.

Ephedrine hydrochloride is an agent having strong sympathetic action of rather prolonged duration and exhibiting little or no toxic tissue reactions. It has few side actions which may be considered unsatisfactory. Absorption from the udder is slow, sustaining activity over a longer period of time than administration by any other route. In higher dosages, there is intestinal stasis and circulatory disturbance. The latitude of dosage of ephedrine is rather broad, usually considered as approximately 0.025 gm., but in the cases described it was increased to 0.5 gm. and occasionally to 1 gm. At the 1-gm. level there were some symptoms of uneasiness and increased heart action, but these were not considered serious.

Sporadic cases of bovine mastitis occur in the dairy herd of the University of Wyoming. Organisms of the genus Micrococcus have been consistently isolated from these cases. These animals have been routinely treated with penicillin with satisfactory results. In using an additional chemical to relieve the congestion of acute cases, it is essential to determine whether the agent may have detrimental effect on the antibiotic.

The effect of penicillin and ephedrine combined, as compared with penicillin alone on micrococci isolated from the udders of the dairy herd, was determined *in vitro*. Bacitracin and terramycin were also tested to determine whether they had any increased activity against these organisms.

Materials and Methods

Clinical Cases. Dosages of 0.5 to 1 gm. of ephedrine hydrochloride were administered with penicillin or terramycin. With crystalline penicillin G the ephedrine was mixed directly

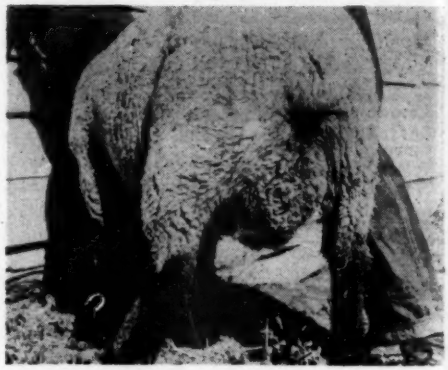

Photo courtesy Dr. E. A. Tunnicliff

Mastitis of left udder. This ewe walks with a limp. Note the position of the left leg when standing. In walking the leg is carried outward with a swinging, wooden-legged motion to avoid contact with the tender udder.

in the glass penicillin vial with 10 cc. of water. When penicillin or terramycin ointment was used, the ephedrine was dissolved in about 10 ml. of water and infused into the udder with a metal infusion tube. Penicillin or terramycin ointment was then infused from the small flexible metal tubes supplied by the manufacturers. The two agents were then gently massaged into the upper portions of the udder by manual kneading. If symptoms subsided within 24 hours, no further treatment was given. Otherwise additional treatments were given at 24-hour intervals until clinical recovery was apparent.

In vitro Tests. The *in vitro* sensitivity of micrococci and Neisseria isolated from the University of Wyoming dairy herd, to penicillin, bacitracin,** terramycin,** and peni-

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*Department of Veterinary Science and Bacteriology, Agricultural Experiment Station, University of Wyoming.

**Bacitracin was supplied by the Commercial Solvents Corporation, Terre Haute, Ind.; and terramycin by Chas. Pfizer & Co., Inc., Brooklyn, N. Y.

cillin combined with ephedrine, was tested. The tube-dilution method described by Prier[1] using brain-heart infusion broth was used.

Udder infusion of 0.5 gm. of ephedrine and 50,000 units of penicillin resulted in relief of symptoms of extreme tenderness and swelling. A second treatment in 24 hours effected apparently complete return to normal.

Initial concentrations of 400 gamma/ml. of antibiotics were used. Dilutions through 0.1 gamma/ml. were made for each test. In the combined penicillin ephedrine trials, 400 gamma/ml. of each were used in the initial tube. Each test was done in duplicate, and the average inhibition point recorded, provided there was close agreement between duplicate samples.

Inoculations were made with one loopful (3.5 mm. diameter) of a 24-hour brain-heart infusion broth culture of the organism. All tubes were incubated at 37 C. Readings were made at 12, 24, 48, 72, and 96 hours of incubation. The lowest concentration of antibiotic inhibiting visible growth was considered as the endpoint.

Results

Clinical Cases. The results are summarized in table 1. Cases 1951-6, -7, -8, -9, and -32 showed extreme swelling, severe congestion, and cyanosis in the dorsal portion of the udder. The administration of 1 gm. ephedrine and 50,000 units penicillin resulted in an immediate reduction of the cyanosis and some alleviation of the swelling. The day following treatment milk was again flowing and the third day recovery was apparently complete.

No. 1951-55 showed the symptoms described above. A temporary response to the ephedrine-penicillin treatment was immediate but it required a second treatment to effect a cure.

TABLE 1. Treatment of Acute Mastitis of Sheep and Cattle with Penicillin and Ephedrine

Case No.	Breed	No. of Treatments	Hours Between Treatments	Treatment	Time of Symptom Alleviation	Results
1951-55	Hampshire	2	120	100,000 units P* and ½ gm. E** per half	Immediate (30 min.)	Recovery in 24 hr. after final treatment. Udder normal.
1951-6	Suffolk	1		50,000 units P and ½ gm. E per half	Immediate (30 min.)	Recovery in 24 hr. Udder normal.
1951-7	Suffolk	1		50,000 units P and 1 gm. E	Immediate (30 min.)	Recovery in 24 hr. Udder normal.
1951-8	Suffolk	1		50,000 units P and 1 gm. E	Immediate (30 min.)	Recovery in 24 hr. Udder normal.
1951-9	Suffolk	1		50,000 units P and 1 gm. E	Immediate (30 min.)	Recovery in 24 hr. Udder normal.
1951-32	Suffolk	1		100,000 units P and ½ gm. E	Slow (2 hr.)	Recovery in 24 hr. Udder normal.
1951-259	Columbia	2	24	100,000 units P and ½ gm. E per half	Immediate (30 min.)	Recovery in 24 hr. after final treatment.
1951-10	Holstein	2	24	50,000 units P and ½ gm. E per quarter. 2 rear quarters.	Slow (2 hr.)	Recovery in 36 hr. after final treatment.
1951-12	Holstein	2	24	50,000 units P and ½ gm. E per quarter. 2 rear quarters.	Slow (2 hr.)	Recovery in 24 hr. after final treatment.
1951-15	Holstein	1		50,000 units P and 1 gm. E per quarter. 2 rear quarters.	Slow (2 hr.)	Recovery—some swelling on third day but with normal blush on skin of udder.

*P — penicillin

**E — ephedrine

In case 1951-259 there was extreme swelling and cyanosis accompanied by a temperature of 106.5 F. The ewe was listless and weak. After administration of the ephedrine-penicillin mixture the cyanosis and congestion were relieved immediately, but there was only slight alleviation of swelling. Treatment was repeated the following day with some improvement. The third day, milk was flowing normally and the swelling had subsided, but there was tenderness upon palpation. The fourth day the tenderness had disappeared.

Animals 1951-10 and 1951-12 were Holstein cows. Symptoms were not as extreme as in the sheep. There was tenderness and extreme swelling. Milk flow was reduced. The ephedrine-penicillin treatment required several hours for relief of congestion. Treatment was repeated the following day. Symptoms were relieved and lactation was normal 24-36 hours following the final treatment. In case 1951-15, symptoms of swelling and congestion were alleviated after one treatment.

In vitro Studies. Fourteen cultures of micrococci and one of Neisseria isolated from udders of the dairy cows and two stock cultures of *Micrococcus pyogenes* var. *aureus* were tested. The culture of Neisseria showed biochemical characteristics of *Neisseria catarrhalis.* The micrococci had pigmented colonies and biohemical characteristics of *Micrococcus pyogenes.*

Inhibition concentrations of penicillin varied from 0.2 gamma/ml. to 9 gamma/ml. at 12 hours of incubation; 0.2 gamma/ml. to 80 gamma/ml. at 24 hours; 0.4 gamma/ml. to 100 gamma/ml. at 48 hours; 6.2 gamma/ml. to 200 gamma/ml. at 72 hours; and 7.8 gamma/ml. to 200 gamma/ml. at 96 hours. Though there was little variation between the penicillin and ephedrine-penicillin at 12 and 24 hours of incubation, there was a marked inhibition of penicillin activity in later readings. At 96 hours of incubation, the endpoint of inhibition in the ephedrine and penicillin mixtures was greater than 400 gamma/ml. with the exception of the stock cultures.

Bacitracin showed an inhibition endpoint of 0.2 gamma/ml. to greater than 400 gamma/ml. at 12 hours of incubation. This inhibition level, however, apparently was due only to brief bacteriostatic activity, since later endpoint readings were greater than 400 gamma/ml.

Terramycin showed the greatest activity against the cultures tested. The inhibition endpoints were 0.2 gamma/ml. to 6.2 gamma/ml. at 12 hours; 0.2 gamma/ml. to 12.5 gamma/ml. at 24 hours; 0.2 gamma/ml. to 18 gamma/ml. at 48 hours; 0.2 gamma/ml. to 25 gamma/ml. at 72 hours; and 0.3 gamma/ml. to 25 gamma/ml. at 96 hours of incubation.

Summary

Ephedrine hydrochloride was used in conjunction with penicillin in treatment of acute mastitis of sheep and cattle. The ephedrine showed marked activity in reducing congestion and swelling of affected udders. *In vitro* studies showed that ephedrine hydrochloride had a detrimental effect on the inhibiting action of penicillin on the growth of micrococci isolated from bovine udders. Terramycin had greater *in vitro* activity against the organisms tested than either penicillin or bacitracin.

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Chloromycetin Therapy in Hard Pad Disease

Favorable results following a treatment regimen that included chloromycetin® and specific antiserum for hard pad disease is reported by Toosey in a recent issue of *The Veterinary Record* (Nov. 24, 1951).

A kennel of 42 adult coursing Greyhounds, over ten months of age, and 27 puppies, under that age, were affected. The outbreak was initially observed among dogs in training which exhibited symptoms of marked lethargy, infected mucous membranes, and severe tonsillitis. A tentative diagnosis of hard pad disease was made.

An initial dose of 0.5 gm. of chloromycetin was given orally, followed by 0.25 gm., t.i.d., for four days. Ten per cent of those treated showed signs of relapse after a varying period following this therapy. In these, recoveries were effected by a second course. Streptomycin was also given when pneumonia was complicating and sulfonamides and kaolin administered in cases of diarrhea.

Of the entire group, one puppy died and three others were destroyed since it was considered that the disease course would affect their future racing. All adults and puppies subsequently were noted to be clinically normal. These remarkable results were credited largely to chloromycetin employed as primary therapy against this virus disease.

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Two Outbreaks Of Hepatic Cirrhosis In Swine In California, With Evidence Incriminating The Tarweed, *Amsinckia intermedia*

J. H. WOOLSEY, JR.,* D.V.M., D. E. JASPER,* D.V.M., Ph.D., D. R. CORDY,* D.V.M., Ph.D., and JOHN F. CHRISTENSEN,* Ph.D., D.V.M.

TARWEED has been recognized for a long time in California as a contaminant of grain fields and pastures, having been reported as a noxious weed by Hilgard[1] as early as 1890. In 1926, Pammel[2] pointed to tarweed as a cause of mechanical injury to livestock feeding in pastures and grainfields containing the plant. McCulloch,[3] in Washington, was the first to demonstrate toxic qualities of the tarweed when taken internally, demonstrating that ingestion of the seeds of *Amsinckia intermedia* was responsible for disease entities in the Pacific Northwest known variously as "walking disease" and "hard liver disease" of horses and "Walla Walla hard liver disease" of swine.

Robbins,[4] *et al.*, describe the plant as a "rough-hairy annual with erect, simple or branching stems, attaining a height of one and one-half to two feet." The flowers are numerous, light yellow in color, and are characteristically arranged along one side of the stem, which is curled at the tip like the neck of a fiddle (fig. 1). The seeds are covered by an outer shell and are called nutlets. They appear very wrinkled, and range in color from brown to black. In screenings and grain mixtures, the individual tarweed seed appears as a small, wrinkled, brown or black seed, about one-third the size of a kernel of wheat.

The writers had the opportunity to study two outbreaks of hepatic cirrhosis in swine during the past year. It is the purpose of this paper to describe these outbreaks, and present evidence incriminating seeds of the tarweed as the causative factor.

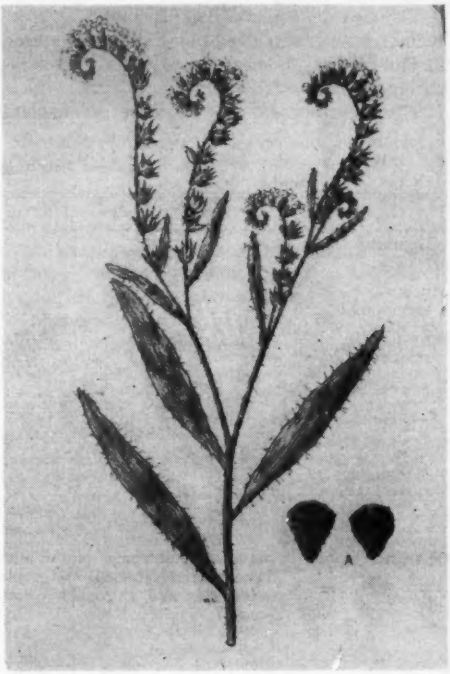

Fig. 1. Tarweed plant and seed. (Robbins, Bellue, and Ball. Weeds of California)

Observations

Herd 1. This outbreak of liver cirrhosis occurred on a hog ranch a few miles north of Sacramento, where approximately 140 pigs of various ages were being fed.

Among the usual disease problems incident to hog raising, the owners reported a type of trouble which was appearing among their pigs with increasing frequency, characterized in the terminal stages by loss of weight, unthriftiness, and in some cases by pot belly. A local veterinarian had autopsied one of these pigs, and had described a small, hard liver and the presence of an estimated four to five gallons of fluid in the peritoneal cavity. One affected pig had reached slaughter weight and was sold, but many of the animals developed rough hair coat, became unthrifty, and finally died. The owners reported losing 16 or 18 pigs showing this

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history, and many more were in various stages of the condition at the time of the study.

Two of the affected pigs, weighing approximately 140 lb. each, and one year-old male were brought to the clinic for autopsy. The significant findings are presented in table 1.

The following hematological findings are also of interest.

	Pig A	Pig B
Hb.	3.85 gm.	1.4 gm.
RBC	2,470,000	690,000
WBC	37,150	32,400

Numerous nucleated red blood cells in addition to Howell-Jolly bodies, anisocytosis, and polychromatophilia were present.

The development of cirrhotic livers and ascites in a large percentage of the pigs suggested the possibility of intestinal absorption of a toxic factor over an extended period of time. Accordingly, an investigation of the premises and feeding program was conducted. Careful search and questioning indicated that no chemical poisons could be incriminated. The ration appeared excellent with the exception of one questionable factor. In addition to soaked barley, cooked meat scraps, alfalfa, and animal protein factor, the pigs received considerable quantities of floor sweepings and sack cleanings from a nearby mill. Many small dark seeds were noted in samples of the floor sweepings and sack cleanings. It was recommended that feeding of the sweepings and cleanings be stopped immediately. Inquiry several weeks later revealed that no new cases of cirrhosis

Table 1. Lesions Found in Pigs from Herd Number 1.

Organ	Year-Old Male	Pig A 140 lb.	Pig B 140 lb.
Integument	——	——	White skinned areas pale and slightly icteric.
Mucous membranes	——	Pale	Pale
Serous cavities	——	Moderate hydropericardium	Peritoneal cavity filled with blood tinged fluid (about 4 gal.) which appeared to be as cellular as the blood itself. Web-like, fibrinous clots containing some blood were scattered over viscera and accumulated on the abdominal floor. Peritoneum was dotted by scattered areas resembling petechiae.
GI tract	Extensive hemorrhage into lumen of terminal small intestine. Gas and mucus in colon.	Large amounts of blood in colon; mucosa not hyperemic. Smaller amounts of blood in small intestine; no hyperemia. Feces in rectum not mixed with blood.	Stomach filled with ingesta and gas, but rest of tract nearly empty. Frequent areas of colon and a few of small intestine contained small amounts of blood. The walls were not hyperemic.
Liver	Very firm and tough, resistant to cutting or tearing. Gall bladder contracted and containing yellow, inspissated bile.	Large, yellowish tan, extremely tough, rubbery and resistant, with some visible scarring. Gall bladder nearly empty, but contained some yellow bile.	Very small, tan, firm, resistant to cutting or tearing. Gall bladder completely contracted, adhesions to diaphragm.
Spleen	Normal	Large	Normal
Microscopic findings	Extensive portal cirrhosis, which has invaded and almost completely destroyed the liver parenchyma.	Some P.M. surface desquamation but no inflammation of stomach, small intestine or colon, even though blood was in the lumen. Marked increase of intra- and interlobular connective tissue in the liver. Proportion of each varied from area to area, with much parenchymal destruction.	Uniform, extensive, intralobular connective tissue. Many hepatic cells have disappeared or are undergoing pressure atrophy. Bile capillaries were distended with bile.

and ascites had developed, and that the previously unaffected pigs were doing well.

No accurate qualitative or quantitative assay of the material was made at the time of the investigation, but the abeyance of the difficulty following removal of sweepings and cleanings from the ration suggested that a toxic factor of plant origin present in these feeds was the causative factor.

Herd 2. This outbreak of liver cirrhosis occurred on a hog ranch near Davis, where about 20 mature pigs and 50 young pigs were being fed.

Eleven of the young pigs died at various intervals over a period of about two months, usually reaching a weight of about 125 lb. before dying. The typical history was reduced growth rate and unthriftiness, followed in the terminal stages by inappetence, weakness, subnormal temperature and prostration. One sow died during this period after abnormal exercise, but was not made available for autopsy. Many pigs finally reached market weight, but were about a month late as compared with normal fattening pigs, and the owner stated that they did not possess the frame of his usual fat pigs.

Significant findings in three of the pigs brought to us for autopsy are presented in table 2.

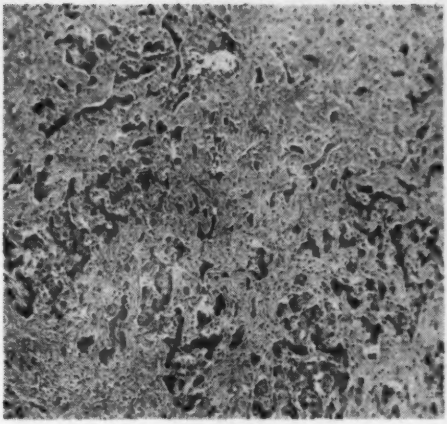

Fig. 2. Liver illustrating intra- and interlobular fibrosis typical of tarweed poisoning. (X 100)

Livers of nine pigs eventually reaching market weight showed no obvious abnormality when examined grossly at the abattoir. One of these, however, when submitted to microscopic examination, showed a marked increase in connective tissue in the portal areas, encroaching upon and destroying many hepatic lobules.

Table 2. Lesions Found in Pigs from Herd Number 2.

Organ	3-Mo.-old Gilt	4-Mo.-old Barrow	4-Mo.-old Barrow
Integument	Purple splotches	Slightly icteric	—
Mucous membranes	Slight mucopurulent exudate from eyes	—	—
Serous cavities	Excess of yellow peritoneal fluid. Peritoneum icteric. Hydropericardium: 200 ml. yellow fluid, with fibrinous tags.	Peritoneum icteric	—
GI tract	Large healing ulcer in cardia. Four small recent ulcers along rugae of fundus of stomach.	—	—
Liver	Small, firm, with some hemorrhagic lobules. Gall bladder edematous and empty except for inspissated bile.	Very small, yellow, and very tough; uniform scarring is evident.	Small, tough, orange tan, nodular
Spleen	Enlarged	Normal	Normal
Microscopic findings	Not examined	Not examined	Marked increase in interlobular connective tissue with some disruption of lobules. Marked canalicular bile stasis. Hypertrophied hepatic cells. Fibrosis of variable intensity in different areas.

The liver cirrhosis found on autopsy of these pigs, and the similarity of symptoms and history with those of the outbreak noted by us earlier, led immediately to an investigation of the feeding program. Again, no chemical poisons could be detected. The ration consisted of wheat flour, alfalfa meal, tankage and mill screenings obtained from a local mill. A random sample of mill screenings was collected for assay and submitted to Mrs. Margaret Bellue, Weed and Seed Botanist for the California State Department of Agriculture. Tarweed seeds were found to be present at the rate of 1 lb. per 450 lb. of mill screenings. Elimination of the screenings was effective in preventing new cases of cirrhosis in this herd.

Discussion

The pathologic physiology leading to terminal hemorrhage into the lumen of the bowel has not been investigated. There is the possibility of a low prothrombin level resulting from the hepatopathy, or affected vascular permeability and integrity resulting from some secondary deficiency or toxin. There is a possibility that hypoproteinemia influenced the development of hydropericardium and ascites, though the latter can be accounted for easily by the mechanical obstruction of the portal circulation through the cirrhotic liver.

These cases illustrate dangers incident to the feeding of screenings, cleanings, or of grain contaminated with seeds of *Amsinckia intermedia*. The experiments of McCulloch[3] demonstrate the toxicity of these seeds to horses, swine, and cattle, and present evidence that sheep and chickens are much more resistant to the toxic principle. Muth[5] demonstrated in two lambs that they could be fattened without harm on feed including 12 oz. per day of a mixture of wheat 75% and tarweed seed 25%. Though tarweed should always be suspected when cases of hepatic cirrhosis are encountered, ragwort, and other hepatotoxins must receive consideration.

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Amendment to Poultry Grading and Inspection Proposed

The Production and marketing Administration of the U. S. Department of Agriculture has proposed changes in the poultry grading and inspection program, which generally follows the proposed recommendations made by public health representatives, industry members and personnel conducting poultry grading and inspection work. It is reported in a news release, dated December 29, 1951, that these amendments are designed to increase the effectiveness of the inspection service in providing customers with wholesome products.

The major proposals would include prohibiting grade labeling of individual carcasses of New York dressed poultry (only feathers removed) after December 31, 1952, and eliminating authority of the Production and Marketing Administration to permit dressed poultry produced in a nonofficial plant to be brought into an official plant for canning. Other proposed recommendations eliminate grade labeling of individual carcasses of dressed poultry unless such poultry has been inspected for wholesomeness. Only fully eviscerated and ready-to-cook poultry will be officially inspected. Poultry plant operators and others interested will have 30 days after publication of the above proposals in the *Federal Register* to submit arguments and views concerning these and further changes contemplated.

Although these amendments appear to take care of the primary objections voiced repeatedly by public health representatives and a few others interested, basic proposals are not affected. This journal has expressed the opinion editorially, as well as the opinion of well qualified veterinarians acquainted with the problems, that to assure an adequate inspection service responsibility for inspection should be transferred from the Production and Marketing Administration to the Meat Inspection Service of the Bureau of Animal Industry.

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In a series of 306 cases of acetonemia in cattle, 60% recovered after one intravenous injection of 500 cc. of 50% glucose solution; 14% following a second injection.—*Jesse Sampson, D.V.M.*

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The incidence of Johne's disease appears to be increasing in California.—*Calif. Vet.*

Antibiotic Agents In Small Animal Practice

S. F. SCHEIDY,* V.M.D., Glenolden, Pennsylvania

ANTIBIOTIC agents, as we know them today, are relatively new but widely used by members of the medical professions. The following antibiotic substances are of clinical interest: tyrothricin, penicillin, streptomycin and dihydrostreptomycin, bacitracin, aureomycin, chloramphenicol (chloromycetin®), and terramycin.

Tyrothricin

Tyrothricin was discovered in 1939 by Dr. René Dubois,[1] a bacteriologist working at the Rockefeller Institute for Medical Research, New York City. This antibiotic substance is produced by *Bacillus brevis.* Tyrothricin is stable under most conditions. It is relatively insoluble in water but dissolves in alcohol or propylene glycol. Tyrothricin actually is a mixture of substances. It is composed of gramicidin (approximately 25%), tyrocidine (about 60%), and a mixture (about 10%) of other active substances related to gramicidin. It is estimated to contain about 2% of fat and 3% of sodium chloride. When tyrothricin is administered intravenously, even in low dosage, it is toxic, having an LD_{50} of about 2 mg. per kg. of body weight. The material causes hemolysis of red blood cells and for this reason it should be used only topically in the treatment of infections.

Streptococci, staphylococci, clostridia, and anaerobic streptococci are some of the bacteria sensitive to this antibiotic. The substance is bacteriostatic and bactericidal for many Gram-positive organisms, but it has no activity against most of those classified as Gram-negative.

Because of its activity against the Gram-positive microorganisms, it immediately interested veterinarians, and shortly was tested as an agent for the treatment of bovine mastitis. It is of interest to know that the first antibiotic substance commercially available in this country, early in 1942, was a preparation containing tyrothricin and designed for intramammary infusion.

Following these early studies, numerous investigations were conducted, in both the human and veterinary field, to find other uses for this active material. It is currently used in the treatment of infected wounds, ulcers, furunculosis, cellulitis, osteomyelitis, and draining sinuses. Tyrothricin is used in solution for irrigation or in the form of wet dressings, emulsions, or ointment.

In 1946, at the American Animal Hospital Association meeting, Dr. L. A. Goodman described the topical use of an 0.03% solution of tyrothricin as a wet dressing for infected wounds of dogs, applied over the affected area. Good results were reported.

Dr. Frank Vigue[2] has published his observation following the use of tyrothricin in the management of burns in dogs. His cases were some of the animals that suffered burns as a result of the devastating fire that occurred in the State of Maine in the fall of 1947. This report included data on 28 animals that were treated by him. He stated, "The treatment of minor burns was not a serious problem. Both tyrothricin ointment and aqueous solution gave excellent results. The ointment was generously applied twice daily and it was noted that less pain was evidenced when this form was used." According to the report, it would appear also that tyrothricin possessed an advantage over other antibiotic agents in that presence of exudates did not markedly reduce its efficacy.

Thomas[3] obtained beneficial results with the use of an 0.02% solution of tyrothricin added to a vasoconstrictor as nose drops for dogs. These agents were used in many cases where nasal congestion was accompanied by mucopurulent exudate or nasal discharge. The solution effected a reduction in the amount of nasal discharge and the dogs suffered less respiratory distress. Five to ten drops were placed in each nostril, three or four times a day, until the nasal discharge had completely disappeared. No untoward after effect was noted.

Bachrach,[4] and Fleck, *et al.*,[5] have reported on the use of 0.05% solution of tyrothricin and an acaricide (benzyl benzoate) for the treatment of parasitic and nonparasitic dermatoses in dogs. In these clinical studies it was

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®Parke, Davis & Company, Detroit, Mich.

assumed that the mange mites were destroyed, and that the antibiotic was beneficial in the treatment of the accompanying or associated bacterial infections of the skin.

Dosage forms. Alcohol-aqueous solution, oil emulsion, and ointment.

Penicillin

Penicillin is the antibiotic substance which had a profound influence on chemotherapy during World War II and now is used widely throughout the civilized world. This substance was discovered by Fleming of England in 1929[6]. However, it did not become available for clinical usage until early in 1945.

Penicillin is produced by *Penicillium notatum* and related species.

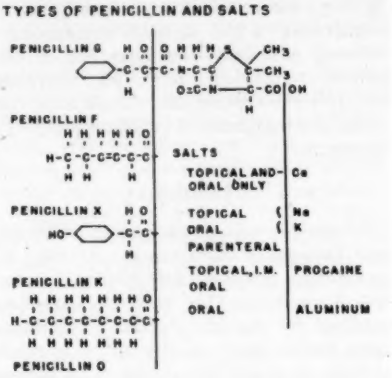
Early supplies of amorphous penicillin were not very satisfactory from a stability standpoint, but the crystalline form that is available today has overcome in part many of these objections.

The common penicillins are types G, F, K, X and O; however, type G is most frequently used clinically. This type is quite satisfactory for chemotherapy and is available in large quantities. With today's purification procedures, 1 mg. of penicillin has a potency of approximately 1,600 units.

Several salts of penicillin have been prepared and their characteristics are worthy of consideration in selecting the drug for treatment of disease. The sodium and potassium salts are soluble readily in water and may be administered by any route. The procaine and aluminum salts of penicillin are not soluble in water; thus, selected routes for their administration are suggested. These salts should not be given intravenously. Sodium, potassium and procaine salts usually are used in various dosage forms.

Absorbed penicillin is eliminated rapidly from the body by the urinary tract. About 20% is excreted by the glomeruli and about 80% by the renal tubules. This rapid excretion can be delayed only by the administration of compounds that compete with penicillin for the enzymes that control the mechanism of tubular excretion. Such compounds are diodrast,[7] para-aminohippuric acid,[8] carinamide (4'-Carboxy-phenylmethane-sulfonanilide),[9] and benemid p-(di-n-propylsulfamyl) benzoic acid[10].

Various dosage forms of penicillin designed to delay the rapid absorption (and hence rapid excretion of penicillin when the agent is administered intramuscularly or subcutaneously) have been prepared. Procaine penicillin particularly is acceptable for such dosage forms because of its slow absorption. Preparations containing substances such as oil, beeswax, and aluminum monostearate must not be given intravenously. The suggestion has been made that the minimal parenteral dosage of penicillin for animals should be at least 2,000 units per pound of body weight every three to four



hours when given in an aqueous medium (sodium and potassium salts); every 12 hours when given in oil and beeswax; and, when used in a repository dosage form such as procaine penicillin in oil, or water with or without aluminum monostearate, at intervals of 24 hours or longer.

Oral administration of penicillin in animals is not used widely; however, experimental studies[11] indicate that appreciable quantities of penicillin are absorbed from the gastrointestinal tract. On the average, about 9 to 10% of the total dose given by mouth to dogs is excreted in the urine. Toxicity studies[12] indicate that relatively large amounts of penicillin may be given without producing toxic manifestations. The LD_{50} (intravenous) dose of penicillin type G, is approximately 5,000,000 units per kg. for mice.

Clinical Indications

Penicillin is indicated in the acute or leptospiremic stage of leptospirosis[13,14]. The agent, however, is not satisfactory for the treatment of chronic cases or carriers of leptospirosis[15].

Penicillin is widely used by veterinarians in the treatment of other septicemic diseases. It frequently is given in addition to antiserum as treatment for the so-called distemper syndrome[16]. Many cases of pneumonia in dogs seem to improve with penicillin therapy. The agent also is used in cases of septicemia asso-

ciated with endometritis and mammitis. Limited data would indicate that some cases of meningitis will respond when penicillin is administered in saline solution in the subarachnoid space[17].

Penicillin frequently is administered more or less prophylactically to surgical patients at the time of operation and for several days afterward. This appears to be a rational procedure, since it apparently is harmless and undoubtedly controls some postoperative infections.

Topical and ophthalmic penicillin ointments frequently are used and with beneficial effect.

Dosage forms. Powder for aqueous solution, penicillin in oil and beeswax, procaine penicillin in oil, procaine penicillin in aqueous suspension, procaine penicillin in oil and aluminum monostearate (also with sodium or potassium penicillin), penicillin tablets of two types: (1) water soluble; (2) compressed tablets (with and without buffering agents), penicillin bougies, penicillin ointments, and penicillin with sulfonamides for oral administration, are available commercially.

Streptomycin and Dihydrostreptomycin

Streptomycin is produced by *Streptomyces griseus.* It was discovered by Dr. S. Waksman and associates[18]. A minor chemical treatment of streptomycin will result in dihydrostreptomycin which is somewhat less toxic than is the original substance. Streptomycin and dihydrostreptomycin are relatively stable in dry form or in an aqueous medium. Streptomycin is available as the dihydrochloride, sulfate, or calcium chloride complex, while dihydrostreptomycin is available as the sulfate. In most instances these salts are interchangeable except when one wishes to mix the substance with certain other agents. The calcium chloride complex will cause a precipitation in phosphate buffered solutions.

This antibiotic is eliminated rather rapidly from the body by the urinary system although not nearly so rapidly as is penicillin. Delayed absorption or excretion of it following intramuscular administration has not yet been accomplished. Intramuscular administration is recommended for the treatment of systemic infections and oral administration for the treatment of enteric infections. Streptomycin is not absorbed from the gastrointestinal tract to any appreciable degree. A minimum of 3 to 6 micrograms (units) per ml. of plasma are considered to be necessary to overcome most of the susceptible organisms. Five mg. of streptomycin per lb. of body weight given intramuscularly in dogs will result in a level of from 6 to 11 micrograms per ml. of plasma after about four hours. Five mg. per lb. of body weight in dogs will result in a concentration of about 100 micrograms per ml. of urine in nine hours. A dosage schedule of 20 mg. of streptomycin or dihydrostreptomycin per lb. of body weight per day has been suggested. It is believed that this amount should be divided and administered in three or four equal doses at eight or six hour intervals. Excessive parenteral dosage may cause vestibular disturbance in animals similar to that observed in human patients. The LD_{50} dose of streptomycin is about 4,500 mg./kg. in mice. In the treatment of certain enteric infections in dogs, an oral dose of 0.5 or 1 gm. twice daily is suggested.

Clinical Indications

Streptomycin or dihydrostreptomycin generally is used in the treatment of infections due to certain Gram-negative organisms or Gram-positive organisms resistant to penicillin. Of these *Escherichia coli* possibly is the most important in animal diseases. Enteric infections,[19,20] and some urinary tract infections have been treated successfully with the substance. Chronic renal leptospirosis in dogs has been treated successfully with streptomycin[21]. Treatment for five days with this antibiotic was found to be fully effective in a limited number of dogs. In one experiment, 40 mg. of streptomycin (in oil and wax) per kg. of body weight was effective when given daily for three to five days. It would appear advisable to administer both penicillin and streptomycin in acute cases of leptospirosis.

Dosage forms. Powder for aqueous solution, bougies and ointment with and without penicillin.

Bacitracin

Bacitracin is produced by *Bacillus subtilis.* It was discovered by Meleney and Johnson[22]. This substance is quite soluble in water but is not stable in solution for a very long time. It is stable in a dry state for long periods of time when it is not exposed to high temperature. Solutions of bacitracin kept at refrigerator temperature will begin to lose potency in about three weeks. Bacitracin in an anhydrous ointment is stable for one year or longer. Water miscible ointments lose potency quite rapidly.

Bacitracin possesses antibacterial activity primarily against Gram-positive organisms and against amoebae. Preparations containing bacitracin, usually solutions or ointments, are applied topically to infected lesions. In certain instances they have been injected into and

around infected areas.

Rose[28] published a report indicating that this antibiotic has a low order of toxicity for dogs, that it can be used topically, or administered orally and systemically. Parenteral use of the substance, however, has not been encouraged since in early studies it was found to produce nephrotoxic effects in some experiments. The LD_{50} dose was 360 mg. (about 7,500 units) per kg. in mice[24].

Bacitracin ointments containing 500 units of the antibiotic per gm. of the base have been found to be useful in the treatment of otitis externa, wounds, and purulent conjunctivitis. Ophthalmic ointments and not topical ointments are suggested for use in the eyes. Aqueous solutions containing 500 units per ml. of the substance are used as wet dressings or for irrigation of infected lesions. Solutions or tablets in doses of about 10,000 units four times daily have been given orally as treatment for diarrhea in dogs[28]. Rose[28] reported that systemic infections in dogs have been treated by intramuscular injections of an aqueous solution containing 1,000 units of the antibiotic agent per kg. of body weight, daily, for three to five days.

Dosage forms. Bacitracin for aqueous solution, ophthalmic and topical ointments, and tablets for clinical use are available commercially.

Aureomycin

Aureomycin is produced by *Streptomyces aureofaciens;* it was discovered by Dr. B. M. Duggar[25]. This antibiotic substance, supplied as the hydrochloride, possesses a wide spectrum of activity against bacterial, rickettsial, large viral, and some protozoan organisms. Because of this spectrum of activity, it is used widely in the treatment of disease. The substance is stable for a long time in a dry state. Aureomycin may be administered orally, intravenously, or topically. Effective blood levels can be obtained and maintained following oral administration of the substance. When intravenous therapy is indicated, only fresh and properly prepared solutions should be used and precautions to prevent leakage into perivascular and subcutaneous tissue should be taken. Such solutions are irritating to subcutaneous tissues.

Aureomycin is found in the urine within one hour following oral administration. Tissue concentrations from two to four times that in the blood have been observed. The concentration in the cerebrospinal fluid of treated animals is about equal to that found in the blood. Aureomycin appears to be concentrated in urine and milk. Traces of the substance have been found in urine 72 hours after the last dose was administered. The LD_{50} intravenous dose of aureomycin hydrochloride is 134 mg. per kg. of body weight in mice, and 118 mg. per kg. in rats[27].

The suggested dosage of aureomycin for animals, when given intravenously, is 5 mg. per lb. of body weight and this is repeated at 24-hour intervals unless oral treatment is provided. When the drug is to be administered orally, it is suggested that the initial dose be 25 mg. per lb. of body weight and 12.5 mg. every 12 hours thereafter until the animal shows definite signs of improvement.

Clinical Indications

Aureomycin therapy has been found useful in the local treatment of skin infections[29,30] and in infections of eyes and ears of dogs and cats[29]. Data have been presented indicating that leptospirosis due to *Leptospira icterohemorrhagica*[30] and *L. canicola*[31] may be treated successfully with aureomycin. Clinical reports not yet published appear to substantiate the above claims.

A brief report by Hage[32] indicates that this antibiotic is of value in the treatment of feline distemper. He suggests that 50 mg. be given orally twice daily. Slappey and Stapleton[33] also have reported favorable results with such therapy in cats.

Limited information would indicate that aureomycin is of value in the treatment of coccidiosis in dogs[34]. The diarrheal condition improves and the feces have been found to be free of coccidial oocysts subsequent to treatment.

Dosage forms. Powder for preparation of solutions; powder in capsules, tablets, and ointment are available.

Chloramphenicol (Chloromycetin)

Chloramphenicol is a crystalline antibiotic substance obtained from cultures of *Streptomyces venezuelae;* it can also be prepared synthetically. This antibiotic-producing culture was isolated by Dr. Paul Burkholder[35] of Yale University. It possesses a wide range of activity against microorganisms including bacteria, rickettsia, and certain large viruses. Chloramphenicol is well and rapidly absorbed from the gastrointestinal tract. The LD_{50} dose is 245 mg. per kg. by oral administration in an acacia suspension for mice[36]. There are indications that chloromycetin is useful in the treatment of urinary tract infections, diarrheas, and sys-

temic bacterial infections in dogs. A few clinical reports (unpublished) indicate that cats suffering with so-called distemper responded to chloromycetin therapy. A dosage schedule of 25 to 75 mg. per lb. of body weight, per day, in divided doses, has been used by some veterinarians.

Terramycin

Terramycin is produced by *Streptomyces rimosus*. It was first reported by A. C. Finlay[37]. Crystalline terramycin hydrochloride is a bright yellow powder possessing potent antimicrobial activity. It is effective against a wide variety of organisms including many Gram-positive and Gram-negative bacteria, spirochetes, rickettsia, and certain of the viruses. Terramycin has been used effectively in the treatment of many diseases in human patients caused by the above-mentioned types of microorganisms, and, in addition, it has been used with considerable success in the control of amebiasis.

Terramycin is readily absorbed and is well tolerated by human patients[38-41]. It will maintain its potency for at least 12 months when stored at room temperature.

Terramycin has been found useful in the treatment of several disease conditions in small animals[42,43,44]. It has been found particularly useful in the treatment of respiratory and urinary tract infections in dogs. Reports also have been presented to indicate that the antibiotic is of value in the treatment of so-called distemper in cats. Candlin[44] has reported this substance of value in patients where the infection apparently was resistant to penicillin therapy. It would appear that a daily dosage of terramycin in small animal patients is about 25 to 50 mg. per lb. of body weight. Pessin and Joran[42] have suggested 5 mg. per lb. per day when given intravenously.

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The superiority of hybrids over better purebred layers is yet to be demonstrated.—*D. C. Warren, Lafayette, Ind.*

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Patent rights have been granted Kenneth A. Smith, Burbank, Calif., on a method of irradiation of canned foods that will destroy microorganisms responsible for spoilage, making possible preservation of canned food without heat.

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A.V.M.A. Convention for 1952

The 89th Annual A.V.M.A. convention is scheduled earlier this year than for any since the first meeting in 1863. Dates (June 23-26, 1952) were chosen after consideration of many factors having to do with availability of adequate facilities for handling the expected 2,500 visitors and other matters judged from the standpoint of veterinarians and their families who regularly combine attendance at the annual meetings with a family holiday.

Fabulous Atlantic City, internationally known convention place and resort, offers facilities not available elsewhere. Unrivaled entertainment is promised in the best East Coast tradition. Situated on an island connected to the New Jersey mainland by causeways, weather conditions of the famed resort are ideal in June.

Airview of a section of Atlantic City, N. J. The three large ocean-front hotels seen in the middle of this photograph will house the majority of A.V.M.A. registrants (left to right: Chelsea, Ambassador, and Ritz-Carlton).

Check List Of Parasites Of Domestic Animals Reported In Georgia

DONALD E. COOPERRIDER,* D.V.M., M.S., Athens, Georgia

THE first information needed with reference to any particular infection, parasitic or other, is the knowledge of its presence or absence.

The first parasite check list published was that by Dikmans[1] in 1945. The second was that by Koutz[2] with reference to the State of Ohio only. Both publications listed the scientific names, location in the host and intermediate host, if any. In addition, Dikmans listed the common name and general geographic distribution within the United States and its possessions.

Dikmans commented upon the poor reports for individual localities and a survey of the literature will immediately impress one with the incompleteness of the information. Much information and many parasites can be collected at abattoirs but the many shipments of animals make efforts to trace infected animals from abattoirs to point of origin fruitless.

As a partial answer to the need for information relative to the usual geographical range of a parasite, the information in this list was collected from the available sources based on parasite surveys by Porter[3] and Spindler,[4] clinical records and autopsies at the School of Veterinary Medicine, University of Georgia,[5] and case reports of the Department of Veterinary Pathology and Parasitology,[5] at the same school.

It is the hope of the author that presentation of this list will stimulate interest in finding and identifying other parasites not listed which may be present in this region.

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Check List of Parasites of Domestic Animals Reported in Georgia

TABLE I. Parasites of Equines

Group and Common Names	Scientific Name	Location Host	Location Intermediate Host
NEMATODES (Roundworms)			
Large stomach-worms	*Habronema muscae, H. majus* (*H. microstoma*)	Stomach	Stable flies, *Stomoxys calcitrans*; House flies, *Musca domestica*
	Draschia megastoma (*Habronema megastoma*)	Stomach	
Small hair worm	*Trichostrongylus axei*	Stomach	
Large intestinal roundworm	*Parascaris equorum*	Small intestine	
Large strongyles (Palisade worms)	*Strongylus equinus*	Large intestine	
	S. edentatus	Large intestine	
	S. vulgaris	Large intestine	
Pinworms	*Oxyuris equi*	Colon	
Abdominal worm	*Setaria equina*	Abdomen	
Lungworm	*Dictyocaulus arnfieldi*	Bronchi	
ARTHROPODS			
Flies (Immature)			
Horse botfly	*Gasterophilus intestinalis*	Stomach	
Throat botfly	*G. nasalis*	Stomach and small intestine	
Lice			
Sucking louse	*Haematopinus asini*	External	

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1. Dikmans, G., Check List of the Internal and External Animal Parasites of Domestic Animals in North America. *Am. Jour. Vet. Res.*, 6:211, 1945.

2. Koutz, F. R., Check List of Parasites of Domestic Animals Reported in Ohio. Reprint, The Ohio State University Press, 1949.

3. Porter, D. A., Incidence of Gastro-intestinal Nematodes of Cattle in the Southeastern United States. *Am. Jour. Vet. Res.*, 3:304, 1942.

4. Spindler, L. A., The Incidence of Worm Parasites in Swine in the Southern United States. *Proc. Hel. Soc. Wash.*, 1:40, 1934.

5. Case Reports, Department of Pathology and Parasitology, School of Veterinary Medicine, University of Georgia, Athens.

6. Clinical Reports, Department of Clinics and Medicine, School of Veterinary Medicine, University of Georgia, Athens.

TABLE 2. Parasites of Swine

Group and Common Names	Scientific Name	Location Host	Location Intermediate Host
TREMATODES (Flukes)			
Lung fluke	*Paragonimus westermanni*	Lungs	Snails and crayfish
CESTODES (Tapeworms)			
Immature Tapeworms (Bladderworms)			
Hydatid	*Echinococcus granulosus*	Liver and lungs	Swine are the intermediate hosts
NEMATODES (Roundworms)			
Gullet worm	*Gongylonema pulchrum*	Esophagus	Various coprophagous or dung beetles; cockroaches
Red stomach worm	*Hyostrongylus rubidus*	Stomach	
Thick stomach worms	*Ascarops strongylina*	Stomach	Various coprophagous or dung beetles
	Physocephalus sexalatus	Stomach	Various coprophagous or dung beetles
Intestinal thread worm	*Strongyloides ransomi*	Small intestine	
Large intestinal roundworm	*Ascaris lumbricoides*	Small intestine	
Swine hookworms	*Globocephalus urosubulatus*	Small intestine	
Whipworm	*Trichuris suis*	Cecum	
Nodular worms	*Oesophagostomum dentatum*	Cecum and colon	
	O. longicaudum	Cecum and colon	
	O. brevicaudum	Cecum and colon	
	O. georgianum	Cecum and colon	
Kidney worm	*Stephanurus dentatus*	Perirenal fat, kidneys and ureters, occasionally in lungs	
Lungworms	*Metastrongylus elengatus*	Bronchi	Earthworms of the genus, Helodrilus
	M. salmi	Bronchi	Earthworms of the genus, Helodrilus
	Choerotrongylus pudendotectus	Bronchi	Earthworms of the genus, Helodrilus
ACANTHOCEPHALA (Thorn-headed worm)	*Macracanthorhynchus hirudinaceus*	Small intestine	White grubs or May beetle larvae
ARTHROPODS			
Flies (Immature)			
Screwworm	*Cochliomyia americana*	In wounds	
Lice			
Common hog louse	*Haematopinus adventicius* var. *chinensis* (*H. suis*)	External	
Mites			
Follicle mite	*Demodex folliculorum*	In skin	

TABLE 3. Parasites of Cattle

Group and Common Names	Scientific Name	Location Host	Location Intermediate Host
PROTOZOA			
Organism of uncertain zoological classification	*Anaplasma marginale*	Blood	
TREMATODES (Flukes)			
Common liver fluke	*Fasciola hepatica*	Bile ducts	See parasites of sheep and goats
CESTODES (Tapeworms)			
Immature Tapeworms (Bladderworms)			
Hydatid	*Echinococcus granulosus*	Liver	Cattle are the intermediate hosts;
Beef measles	*Cysticercus bovis*	Heart and voluntary muscles	Cattle are the intermediate hosts man is the definitive host
NEMATODES (Roundworms)			
Gullet worm	*Gongylonema verrucosum*	Esophagus	See parasites of swine
Twisted stomach worm	*Haemonchus contortus*	Fourth stomach or abomasum	
No common name	*H. similis*	Fourth stomach or abomasum	
Medium stomach worms	*Ostertagia ostertagi*	Fourth stomach or abomasum	
Small hair worms	*Trichostrongylus axei*	Fourth stomach or abomasum	
Intestinal worms			
Hookworms	*Bunostomum phlebotomum*	Small intestine	
Small hair worm	*Trichostrongylus colubriformis*	Small intestine	
Small intestinal worms	*Cooperia punctata*	Small intestine	
	C. curticei	Small intestine	
	C. oncophora	Small intestine	
	C. pectinata	Small intestine	
Thread-necked strongyles	*Nematodirus spathiger*	Small intestine	
	N. helvetianus	Small intestine	
Capillarids	*Capillaris bovis*	Small intestine	
Whipworms	*T. discolor*	Cecum	
Nodular worm	*Oesophagostomum radiatum*	Cecum and colon	
Lungworms			
Thread lungworm	*Dictyocaulus viviparus*	Bronchi	
Abdominal worm	*Setaria cervi* (*Setaria labiato-papillosa*)	Abdominal cavity	Unknown
ARTHROPODS			
Ticks			
American dog tick (Wood tick)	*Dermacentor variabilis*	External	
Lice			
Sucking lice			
Short-nosed cattle louse	*Haematopinus eurysternus*	External	
Flies (Immature)			
Common cattle grub	*Hypoderma lineatum*	Under skin of back	
Screwworm	*Cochliomyia americana*	In wounds	

TABLE 4. Parasites of Dogs and Cats

Group and Common Names	Scientific Name	Location Host	Location Intermediate Host
PROTOZOA			
Flagellates	*Giardia canis*	Large intestine	
Sporozoa	*Isospora rivolta*	Small intestine	
Coccidia	*I. bigemina*	Small intestine	
	I. felis	Small intestine	
CESTODES (Tapeworms)			
Armed Tapeworms			
Double pored tapeworm	*Dipylidium caninum*	Small intestine	
Single pored tapeworm		Small intestine	
No common name	*Taenia taeniaeformis*		
No common name	*Taenia pisiformis*	Small intestine	
NEMATODES (Roundworms)			
Large roundworms	*Toxocara canis*	Small intestine	
	T. mystax	Small intestine	
	Toxascaris leonina	Small intestine	
Hookworms	*Ancylostoma caninum*	Small intestine	
Whipworms	*Trichuris vulpis*	Cecum	
Lungworms	*Aelurostrongylus abstrusus*	Lungs	
Esophageal worm	*Spirocera lupi*	Esophagus, stomach aorta	
Heartworm	*Dirofilaria immitis*	Heart and pulmonary artery	Mosquitoes of the genera Aedes, Culex and Anopheles
Kidney worm	*Dioctophyme renale*	Kidneys, abdominal cavity	Branchiobdellids and North American bullhead
ARTHROPODS			
Flies (Immature)			
Bot flies			
rodent bot	*Cuterebra spp.*	Under skin	
Screwworm	*Cochliomyia americana*	In wounds	
Arachnids			
Tongue worm	*Linguatula serrata*	Nasal cavities	Cattle, sheep, goat and rabbits
Ticks			
Brown dog tick	*Rhipicephalus sanguineus*	External	
American dog tick (wood tick)	*Dermacentor variabilis*	External	
Fleas			
Dog flea	*Ctenocephalides canis*	External	
Cat flea	*C. felis*	External	
Sticktight flea	*Echidnophaga gallinacea*	External	
Lice			
Sucking lice			
No common name	*Linognathus setosus*	External	
Biting lice			
No common name	*Trichodectes canis*	External	
Mites			
Sarcoptic scab mite	*Sarcoptes scabiei*	In burrows in skin	
Red mange mite (follicle mite)	*Demodex folliculorum*	In skin	
Chiggers	*Eutrombicula alfredugesi* (*Trombicula irritans*)	In skin	

TABLE 5. Parasites of Poultry

Group and Common Names	Scientific Name	Location Host	Location Intermediate Host
PROTOZOA			
Flagellates			
No common name	*Trichomonas gallinae*	Crop	
No common name	*Hexamita meleagridis*	Intestine	
No common name	*Histomonas meleagridis*	Intestine	
Sporozoa			
Coccidia			
No common name	*Eimeria tenella*	Ceca	
No common name	*E. maxima*	Small intestine	
No common name	*E. meleagridis*	Small intestine	
No common name	*E. meleagrimitis*	Small intestine	
No common name	*E. necatrix*	Small intestine	
No common name	*E. brunetti*	Small intestine	
CESTODES (Tapeworms)			
No common name	*Davainea proglottina*	Small intestine	Slugs, *Agriolimax agrestis*
No common name	*Amoebotaenia sphenoides*	Small intestine	Earthworms. *Helodrilus foetidus, Pheretina pequana, Allobobrophora chloritica*
No common name	*Hymenolepis carioca*	Small intestine	Beetles, *Anisotarsus agilis, Aphodium granarius, Choeridium histeroides;* stable fly, *Stomoxys calcitrans*
No common name	*H. cantaniana*	Small intestine	Dung beetles, *Aetenius cognatus, A. stercorator, Choeridum histeroides*
No common name	*Raillietina cesticillus*	Small intestine	Beetles, *Amara spp., Anaferonia spp., Anisotarsus spp.,* and many others
No common name	*Choanotaenia infundibulum*	Small intestine	House fly, *Musca domestica;* ground and dung beetles, *Amara fallax, Anaferonia constricta, Cratascanthus dubius, Aphodius granarius* and others; grasshoppers, *Melanoplus femurrubrum, Dicromorpha viridis*
NEMATODES (Roundworms)			
Large intestinal roundworms	*Ascaridia galli*	Small intestine	
No common name	*Capillaria caudinflata*	Small intestine	Earthworms
Cecal worms	*Heterakis gallinae*	Ceca	
ARTHOPODS			
Ticks			
Chicken tick (blue bug)	*Argas persicus*	External	
Fleas			
Sticktight flea	*Echidnophaga gallinacea*	Eyes, wattles, and comb	
Lice			
Biting lice			
Head louse	*Lipeurus heterographus*	Head	
Wing louse	*L. caponis*	Wing feathers	
Body louse	*Eomenacanthus stramineus*	Body	
Mites			
Chicken mite	*Dermanyssus gallinae*	Skin	
Bedbugs	*Cimex lectularis*	Skin	

TABLE 6. Parasites of Sheep and Goats

Group and Common Names	Scientific Name	Location Host	Location Intermediate Host
TREMATODES (Flukes)			
Common liver fluke	*Fasciola hepatica*	Bile ducts	Aquatic snails, *Lymnea (Galba) bulimoides, L. (Galba) bulimoides techella*
NEMATODES (Roundworms)			
Stomach Worms			
Twisted stomach worm	*Haemonchus contortus*	Abomasum or fourth stomach	
Medium stomach worm	*Ostertagia circumcincta*	Abomasum or fourth stomach	
	O. trifurcata	Abomasum or fourth stomach	
Small hair worm	*Trichostrongylus axei*	Abomasum or fourth stomach	
Intestinal Worms			
Hookworm	*Bunostomum trigonocephalum*	Small intestine	
Small hairworms	*Trichostrongylus colubriformis*	Small intestine	
Small intestinal worms	*Cooperia curticei*	Small intestine rarely abomasum	
	C. punctata	Small intestine rarely abomasum	
	C. pectinata	Small intestine rarely abomasum	
Thread necked strongyle	*Nematodirus spathiger*	Small intestine	
Nodular worms	*Oesophagostomum columbianum*	Cecum and colon	
Large mouthed bowel worm	*Chabertia ovina*	Colon	
Lungworms			
Thread lungworm	*Dictyocaulus filaria*	Bronchi	
ARTHROPODS			
Flies (Immature)			
Sheep botfly	*Oestrus ovis*	Nasal cavities and sinuses of head	
Screwworm	*Cochliomyia americana*	In wounds	

The control of animal breeding, insofar as the advent of estrus and the period of the year that conception shall take place, has been the desire of animal husbandrymen for many years. There are frequent reports of success following the use of pregnant mare serum, which is both follicle-stimulating and luteinizing, on both the boar and the sow. The boar, when called upon to serve several sows, should receive subcutaneously or intramuscularly 750 rat units of the pregnant mare serum about two weeks before he goes into service, and again at the same time that the sows are treated. The sows receive 500 rat units of the hormone with estrus usually appearing from the third to the sixth postinjection day.

Psittacosis (ornithosis) in man is described in most treatises on the subject as being due to an infection derived from parakeets, pigeons, canaries, finches and other birds. Now comes a report from the laboratories of the Texas State Health Department that an outbreak of the ailment in Texas was traced back to the handling of turkeys, and possibly chickens, when these fowl were in the process of being dressed in a poultry and egg plant. Since psittacosis is an inapparent infection in birds, there was no visible evidence to indicate that the fowl in question were not entirely free from disease.

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EDITORIAL COMMENTS

Undulant Fever Victim Wins Judgment in Court

A decision awarding damages for undulant fever, contracted as a result of handling cattle infected with brucellosis, has been affirmed by the Supreme Court of the State of Washington.

This opinion is unique in that it is the first time damages have been awarded because a human being contracted the disease from a brucellosis-infected herd.

According to a report appearing in the *Western Livestock Journal*, George Cloakey, a Michigan farmer, sold out his farm in 1948 and moved to Washington. He bought a half-interest in a dairy herd owned by Lawrence J. Bouslog and his wife of Mount Vernon. A trial court held that the Bouslogs represented the herd as brucellosis-free, although it was under a USDA quarantine at the time of the sale. Cloakey operated the herd for a little more than a year, during which time the disease spread. In 1949 he became ill with undulant fever.

The lower court allowed Cloakey $1,417.55, the difference between what he paid for the herd and what he received when the animals later were sold for slaughter. He also was allowed damages of $3,158. for loss of milk production because of the diseased condition and was awarded damages of $5,000. because of having contracted undulant fever from the herd. The State Supreme Court affirmed the decision of the trial court.

Editor's Comment

This legal opinion is of notable significance. It is the first to give legal emphasis to the liabilities of ownership of Brucella-infected animals. It should serve as a stimulus to eradication efforts and as a deterrent to unscrupulous breeders, traders, and others who deal in known infected stock. Matters involving compensation under certain state laws and responsibilities of owners and handlers of infected stock are possible legal entanglements. Furthermore, it should make crystal-clear the advisability of distinguishing reactors. Classification of undulant fever as an occupational disease is gaining advocates.

Readers are referred to a report by Dr. T. O. Brandenburg, state veterinarian of North Dakota, which appeared in VETERINARY MEDICINE for February 1950, page 90. This report of civil action involved an infected herd belonging to a landlord, W. O. Otten. The tenant, Joseph Ripplinger, sued the landlord for losses occurring from the spread of infection from animals owned by the landlord to those belonging to the tenant. The jury in this case awarded the plaintiff $2,500. damages.

Aside from statutes dealing specifically with brucellosis, it is a principle of common law that all sales are made under contract. The contract (usually called a warranty in the case of animal sales) may be written, verbal or implied. The written contract, if one is made, may be elaborate or simple "as is." The verbal contract, always more difficult to prove, may be anything from a long harangue to the simple statement; "This animal is o.k." The implied contract, that is where nothing as to the animal is written or spoken, always warrants that so far as the seller knows the animal is healthy (except for admitted defects) and useful for the purpose for which it is sold. Damages are recoverable for breach of contract or warranty which, as shown in the foregoing case, may be substantial in the case of the sale of a diseased animal.

The practice of letting "someone else own it" in the case of an animal that is known or suspected of being diseased is all too common. More frequent damage suits by victimized purchasers would have a wholesome effect on herd dispersal sales and community sales markets too.

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As a visitor to the Milwaukee convention of the A.V.M.A. last August, D. D. Ogilvie, M.R.C.V.S., Veterinary Research Director, Imperial Chemical Industries, London, England, summarized brief notes of activities in *The Veterinary Record* (Dec. 15, 1951) as follows: "One could not help being impressed with the energy and enthusiasm which had been shown throughout by speakers and audience alike. Technically, American veterinary service, as judged by most of the contributions, is at a high level."

He also suggested an annual speaker-member exchange between the A.V.M.A. and the N.V.M.A.

Alabama Prohibits Sale of HC Virus

Alabama is the first state to enact a law which forbids the use of live, virulent, hog cholera virus in the state for immunization of swine. In addition to making unlawful possession, sale, barter, exchange, or other methods of disposal of virus, the new act (No. 308), recently passed by the legislature and now in effect, provides for the distribution of free serum and vaccine through local administrators. This experiment will be watched with interest and speculation.

It is anticipated that by these means hog cholera can be controlled in Alabama as effectively as these measures have assisted in Canada. Thus, Alabama becomes an experimental region to test whether by merely eliminating a virulent virus used for immunization, a disease can be effectively controlled or whether such elimination can even be a significant factor in the reduction of incidence.

It remains to be demonstrated if rigid application of these principles will be effective. There are still many unknowns of how infection may be introduced in susceptible herds.

A rather complete discussion of how the new law will function is given in question and answer form, appearing in *The Auburn Veterinarian*, Fall 1951, page 10. This was prepared by Dr. R. S. Sugg, dean of the School of Veterinary Medicine and former state veterinarian, and Mr. G. B. Phillip, specialist in animal husbandry at Alabama Polytechnic Institute.

By making application to the local administrator, as appointed by the state veterinarian, farmer and swine growers (not commercial garbage feeders nor traders) may receive free serum and vaccines (blood and tissue vaccines) for vaccination of animals owned. The farmer pays the administrator and the veterinarian for services.

New vaccines have not been approved for unrestricted use in Alabama. A qualified practitioner may be granted authority, on request, to use these if he will agree to record and report results.

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At mid-November, the British Ministry of Agriculture reported that "more than a dozen" outbreaks of foot-and-mouth disease had been confirmed in eastern and midland counties of England. About 1,750 animals involved were slaughtered, and restrictions placed on movement of animals from the area.—*Vet. Rec., Nov. 24, 1951.*

Hormone Stimulation of Lactation

Pellets prepared for implantation and containing progesterone, diethylstilbestrol, and throprotein, administered to two sterile calves caused them to produce milk on the 64th and 97th days after treatment. According to experimental work at the Michigan State College, East Lansing, reported by Dr. Joseph Meites and E. T. Reineke, each of these heifer calves produced more than 6,000 lb. of milk and more than 320 lb. of butterfat during a 300-day investigation period. These quantities are said to be about equal to the production of normal, first-calf, Guernsey heifers.

The experiment was repeated on two four-year-old sterile Holstein cows. One of these attained a peak of 80 lb. of milk a day and produced a total of 298 lb. of butterfat; the second, 45 lb. of milk a day and 177 lb. of butterfat, in four months. The authors suggest that similar implantations may prolong regular lactation periods in producing cows.—*Drug Trade News, December 10, 1951, p. 65.*

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Tick Paralysis

Unexplained ataxia and sudden paralysis in man, resulting from the bite of certain female wood and dog ticks, has been reported from 15 states. Kittrell (*Jour. Am. Med. Assn.*, 147:1561 [Dec. 15], 1951) reports a typical case which made rapid and complete recovery following removal of one tick, identified as *Dermacentor variabilis*, from the occipital region of a four-year-old girl.

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Meat for Servicemen

The average per capita consumption of meat in the armed forces approximates 285 lb. per year. This is double the civilian consumption, according to R. C. Pollock, secretary, general-manager, National Livestock and Meat Board. The inclusion of high quality, nutritious meat in the diet of servicemen is assurance that personnel of the U. S. Armed Forces continue to be the best fed of military forces anywhere in the world.

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Excessive straining after rectal examination of the genital organs of mature cattle is usually a result of carelessness or too vigorous manipulations. An animal should have her tail down and be eating or cud-chewing by the time two others have been examined.—*Dyar C. Wood, D.V.M.*

The Crate of Live Chickens

The once familiar crate of live chickens is fast disappearing. The customer who selected a bird from the crate after judging its fitness by feeling the breadth of the keel, now demands a ready-to-cook, dressed and drawn fryer, wrapped in protective cellophane. Few butchers carry live poultry, not only because of the demand and availability of a superior clean product, but because they cannot compete with the modern dressing establishment. Even dressers find their business tends to be more intricate and complex. The old operation of scalding and picking, termed "New York Dressed", has fewer advocates and consumer preference is swinging toward the eviscerated and cut-up poultry carcass.

These trends are encouraging. Everywhere in the United States both live chickens and New York dressed are passing out of the market picture. In their place, a bird is offered for sale which has been scientifically bred and reared and, when prime, slaughtered in a clean, inspected establishment. Inspection of such eviscerated poultry, whether whole or cut-up, will assure consumers wholesome meat and the producers ever-increasing demand.

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New World's Milk Production Record

The milk production record set ten years ago by Holstein-Friesian cow, Carnation Ormsby Madcap Fayne, on four-time milking has been broken. The new champion, an eight-year-old Holstein cow, Green Meadow Lily Pabst, produced 42,805.6 lb. of milk on a three-time milking schedule in 365 days. The new record was made on the dairy farm of Merle H. Green, Elsie, Mich.

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There appears to be no improvement in egg production because of inclusion of antibiotics in the rations of pullets. Neither has there been conclusively demonstrated improvement of production by any adult animals or birds following the addition of these agents to the rations. The action is significant only for growth stimulation in young animals on diets of questionable completeness.

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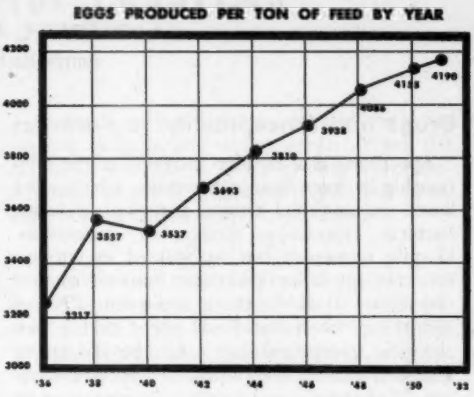
In surveys in which the U. S. Public Health Service has participated, a rate of approximately 1,715 tuberculosis suspects are identified in each 100,000 adult population.

More Eggs Per Hen and Unit of Feed



Courtesy Feeding Forum

The accompanying chart, prepared and published by the American Feed Manufacturers Association, illustrates the capital achievement of American poultrymen. In 1936, the national average annual production was 121 eggs per layer and a total of 3,217 eggs were produced per ton of feed. During the past 15 years, egg production and efficiency of feed utilization have steadily increased to the 1951 national average (estimate) of 169 eggs per layer and 4,190 eggs per ton of feed.

Practical application of facts revealed by research in nutrition is given the major credit for this excellent record. However, improved practices of feeding, breeding, management, and sanitation have also aided in achievement of the highest production record in history.

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Losses Due to Cattle Grubs

Larvae of the heel fly cut into cattle profits in three ways: (1) Damaged hides, often appearing as though pierced with buckshot, are regularly docked; (2) meat products must be trimmed by the packers when infested with these larvae, which may lower value of the entire carcass or cuts; and (3) lastly, and not so frequently considered, is damage done to the cattle themselves. Experiments at the Texas A. & M. College indicate that when cattle are treated for grubs, significant additional gains in weight are made during the year.

In some regions of our range country, as high as 80% of the cattle are infested with grubs, which results in costly damage and reduced profits.

VETERINARY PARASITOLOGY

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Drugs and Susceptibility to Parasites

Specificity is a cardinal attribute of the relationship between host and parasite, whether the latter are so-called animal parasites or fungi, bacteria, rickettsiae, viruses, or spirochetes. Despite numerous but recognized exceptions, this concept is an axiomatic basis of control measures. It is therefore noteworthy, if not disturbing, when one finds proof that a biochemical compound can alter the innate, or inherent, immunity of a host to a specific parasite, a phenomenon recently demonstrated by Terzian[8]. The finding is not of immediate significance to veterinary parasitology since it concerns the mosquito host of a malarial parasite.

Sulfonamides increased the inherent susceptibility of the mosquito and the effect was nullified by para-aminobenzoic acid. This phenomenon, as implied by the author, may well be fundamental to an understanding of the factors that govern the innate immunity of organisms to infectious agents. Thus, for the first time, there is the suggestion that chemotherapy may, at times, open the door to parasitic and other injurious organisms by which the patient would normally have been unaffected.

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Because of the excellent weight gains of lambs maintained on phenothiazine-salt mixtures, the thought has occasionally been expressed that the drug may have inherent growth-promoting properties. Some recent tests to determine this point[12] indicate that the good effects result from control of parasites and that the chemical does not directly stimulate growth.

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From a review of the scattered literature on the pathogenicity of ruminant tapeworms (Moniezia), together with observations on experimental infections in 14 lambs, Kates and Goldberg[10] found no evidence that the parasites in question were injurious to their hosts.

[8]Terzian, L. A., The Sulfonamides as Factors in Increasing Susceptibility to Parasitic Invasion. *Jour. Inf. Dis.*, 87:285, 1950.

[12]Allen, R. W. and Kyles, P. M., Tests with a Phenothiazine-Salt Mixture as a Growth Stimulant for Sheep. *Proc. Helm. Soc. Wash.*, 18:102, 1951.

[10]The Pathogenicity of the Common Sheep Tapeworm, *Moniezia expansa*. *Proc. Helm. Soc. Wash.*, 18:87, 1951.

Toxicology of Dieldrin

The widespread use of many insecticides has confronted some veterinarians with difficult cases of poisoning. A study[3] of dieldrin, which is coming into increasingly wider use as a residual insecticide, notes that animals poisoned by this compound "show convulsions, loss of appetite, weight loss, and a variety of pre- and postconvulsive disorders" and that acute poisoning may be rapidly fatal. The effects are therefore essentially similar to those of all the newer insecticides, the chief symptoms being referrable to the central nervous system, although diagnosis ordinarily rests upon deductions from the patient's history. The report recommends the antidotal use of barbiturates, the effects of which were often striking, but the possibility of great benefit from calcium therapy, as suggested for lindane poisoning,[4] should not be overlooked.

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Capillaria annulata of Poultry

The poultry cropworm, *C. annulata*, was described nearly a century ago and is of cosmopolitan distribution, but its transmission by earthworms was determined comparatively recently[1]. A subsequent study[2] indicates that *Lumbricus terrestris*, reported for the first time as an intermediate host, is the most susceptible of several species of earthworms. Other known intermediate hosts are *Allolobophora caliginosa trapezoides*, *A. c. typica*, and *Eisenia foetida*.

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A report by Durbin[11] of the Bureau of Animal Industry, indicates that the new mammalian malarial parasite, *Plasmodium berghei*, is presumably not infective for domestic animals. The experimental study of this valuable test organism, which is readily maintained in certain laboratory animals, does not appear, therefore, to present a hazard to American livestock interests.

[3]Hayes, W. J., *et al.*, The Toxicology of Dieldrin and its Bearing on Field use of the Compound. *Am. Jour. Trop. Med.*, 31:519, 1951.

[4]Enzie, F. D. and Foster, A. O., The Use of Calcium Gluconate in the Treatment of Lindane Poisoning. *Vet. Med.*, 46:439, 1951.

[1]Wehr, E. E., *N. Am. Vet.*, 17:18, 1936.

[2]Allen, Rex, *Proc. Helm. Soc. Wash.*, 17:58, 1950.

[11]Attempts to Transfer *Plasmodium berghei* Vincke and Lips to Domesticated Animals. *Proc. Helm. Soc. Wash.*, 18:108, 1951.

POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.
Frederick, Maryland

The common breeds of geese are Toulouse, Emden, African, Chinese, Canada, Pilgrim, American Buff, Sebastopal, Egyptian and White Roman.

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A mechanical gizzard skinner which is in common use in poultry processing plants is capable, according to the manufacturer, of automatically removing the "skin" from 1,400 gizzards per hour.

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The male goose, or gander, should not be mated to more than five females. Many commercial growers supply one gander for each two females. Females will lay until they are ten or more years' old and ganders may be kept for at least five years.

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Commercial poultry meat production exceeded farm flock production for the first time in 1950, when 616,000,000 commercial broilers were grown. This compares to 100,000,000 produced in 1939 according to Carpenter. It is estimated that 750,000,000 will be produced in 1951.

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Buying of started chicks, pullets, or adult cockerels for replacements is one of the best ways that I can think of to introduce diseases into a flock. It may take a little longer to rear day-old chicks which should come from disease-free sources, but the extra trouble is good insurance against purchase of some unwanted disease.

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The largest volume of semen that can be obtained at one time from a single male turkey for artificial insemination purposes is 0.5 ml. The average is nearer 0.2 ml. Maximum fertility can be maintained with insemination of 0.025 ml. of undiluted serum per female, repeated every three weeks. Eggs should become fertile within 48 hours after insemination. To obtain the best results, the male should not be stripped more often than every other day, or an average of three times per week. At this rate, the average tom is capable of maintaining fertility in 72 hens. (Lorenz and Carson, *Nulaid News*, 30:14 [Nov.], 1951).

Day-old goslings may be sexed in the same manner as chick and turkey poults. When the cloaca is inverted the male gosling has a distinct whitish papilla about one-eighth inch long. This is only rudimentary in the female.

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A new blood group in chickens is reported by Briles (*Proc. 40th Ann. Mtg. Poultry Sci. Assn., 1951*). He has labelled this as the D group which brings to four (A,B,C,D) the number of autosomal loci known to have antigenic effects in chickens.

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Quail are very resistant to vitamin A deficiency according to research work by Callenbach (*Pa. Agr. Exp. Sta. Bul. 540*). In a vitamin A depletion test on adult quail no deficiency symptoms were observed after 119 days. This indicates that quail are able to withstand a long winter period of vitamin A deficiency.

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The Japanese have developed a chick sexing machine by which they claim it is possible to sex 600 chicks per hour with 100% accuracy (*Poultry Farmer* (British), Aug. 17, 1951). The device consists of an illuminated glass tube which when inserted into the vent makes it possible to view the sex organs by the aid of a special optical eye piece.

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Cannabilism in the brooder house is usually the result of an error in management and a thorough survey should be made to determine some fault in management as soon as this vice is observed in a block. Ventilation, floor, eating and drinking space, and feeding practices should all be checked. Different ages of chicks, and even different breeds in the same brooder may encourage the habit.

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The period of incubation for goose eggs from the usual breeds varies from 28 to 31 days. The larger breeds take longer than the smaller ones. Eggs from wild geese (Canada) requires 35 days to hatch. Fertility is generally good but hatchability, especially in incubators, is usually poorer than for chicken and turkey eggs. Most hatchery operators obtain from 40 to 60% hatchability.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Some weeks ago, I addressed a gathering of physicians. One of them raised what to him was an important question, *i.e.*: "If a child has been bitten in the face by a dog that at the time of the bite shows no clinical evidence of rabies, and which the owners contend was vaccinated by the single injection method within the previous six months, should the child be given the Pasteur treatment or later modifications of it?"

Our answer was that if because of the vaccination, the dog had a solid immunity then its saliva was free from rabies virus. The hazard in the foregoing reply is that one can never be certain that a solid immunity is established in every dog that has received no more than a single injection. If the owner could assure the physician that the dog had three injections of rabies vaccine with an interval of ten days between each, we, as veterinarians, could state with reasonable safety that resulting immunity was solid for a limited period.

Another question raised by a physician: "If a child is bitten in the face by a dog showing no evidence of disease, and in which there is no sign of illness at the time it inflicts the bite, should the child receive immunizing injections at once, especially as they are expensive and the child resents the treatments?"

We could only say that since the virus of rabies has been known to exist in the saliva for as long as five days before the appearance of clinical symptoms are evident in the dog, and as the distance of the wound on the face is so short to the central nervous system, we still advise to start at once giving the child the treatment. It is the only safe thing to do; this is an opinion shared by many veterinary practitioners. If in the course of ten days after the bite, the dog develops no clinical symptoms, then the treatment may safety be discontinued.

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In the *Journal of the American Medical Association*, November 3, 1951, there is a report of a case of leptospiral infection due to *Leptospira pomona*. This organism is said to be associated principally with hogs and cattle, and therefore human beings infected with it are said to have "swineherd's disease." The clinical picture in man is that of aseptic meningitis.

A question was directed to us from a practitioner in which he asks: "Is it advisable to attempt an abortion in a very small heifer three months' pregnant; if so, how?"

If the small size of the genitalia in the heifer does not prevent digital expression, per rectum, of the corpus luteum, it is the recommended method for termination of pregnancy. If the heifer is too small to allow such manual expression, ovaries may be reached by performing a laparotomy in the upper left flank. Another, though much more difficult, method is to destroy the seal of the cervix; carefully dilate the latter and then resort to sufficient currettage to dislodge the fetus. To answer the first portion of the question last, our advice is against an artificially induced abortion unless there is a good reason to believe that permitting the pregnancy to go to term will endanger the life or future breeding efficiency of a valuable female.

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In the great southwest sheep country, sheepmen are enthusiastic regarding the effectiveness of a single, complete immersion in benzene hexachloride (BHC) solution for the control of scabies. The solution used is 5 lb. of BHC in 100 gal. of water; for replacement, 5.5 lb. in 100 gal. of water are used. Heavily fleeced ewes and rams will come out of the dip saturated with it, and even after preliminary draining will retain up to 4 gal. of solution in the fleece. These animals must have support to prevent drowning during immersion. A single dipping furnishes a lengthy protective period (residual control) against reinfestation.

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It is of interest to note from the records of the federal Meat Inspection Service the number of horses slaughtered, by fiscal years, in federally inspected plants: 241,036 in 1948; 307,785 in 1949; 240,010 in 1950; and 319,601 in 1951. Also, though from an entirely different source of information, we have learned that annually, under the provisions of the Kansas Meat and Poultry Inspection Law as passed by the 1945 legislature, more than 45,000,000 pounds of meats, not including poultry, are inspected by approved veterinarians.

ABSTRACTS OF LITERATURE

Milk Plate Test for Brucellosis

A practical laboratory and field test for brucellosis in cattle has been developed by BAI veterinarians[1].

In preliminary studies, the authors identified 99.7% of milk samples collected from known infected cows by the new milk plate method. Equipment necessary for the performance of the test is that ordinarily used for the conduct of the serum agglutination test. Antigen required has been especially prepared for the method and contains a 3% suspension of stained cells. Twelve minutes' time is required to obtain a reading.

The convenience and comparative simplicity of this new test, in consideration of its specificity, adds a tool vital to eradication efforts. It should find wide use in conjunction with other diagnostic procedures to establish its reliability.

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Immunity of Foals to Tetanus

Research work was carried out on 40 mares and their offspring[7]. The mares were immunized during the gestation period and the foals were not allowed to feed from the mare before their blood titer for antitoxin was measured. In the case of 17 foals, where the mares were inoculated and re-inoculated during pregnancy with tetanus antitoxin, nine had no traces of antitoxin in the serum, two had traces, and six had titers of 1:400 to 1:50.

With mares immunized with diptheria antitoxin and tetanus antitoxin, 20 foals all showed variable titers.

From these results, the authors conclude that the mare may transmit to the foal an appreciable immunity for tetanus through the placenta. However, from a practical point of view, in absence of information on the antitoxic titer of the mare, it is necessary to assure that the young animal ingests a quantity of colostrum, especially the first colostrum.—*M.A.S.*

[1]Blake, Grant E., Manthei, C. A., and Goode, E. R., Jr., A Milk Plate Test for the Detection of Brucellosis. *Jour. Am. Vet. Med. Assn.*, 120:1 (Jan.), 1952.

[7]Lemetayer, E., Nicol, L., Girard, O., Corvazier, R., and Cheyroux, M., Nouvelles Recherches sur le Passage des Antitoxines a Travers le Placenta chez la Jument. *Bul. Acad. Vet. France*, 22:367 (Nov.), 1949.

New Therapy for Trichomonas Infection

Investigations at the Veterinary Institute of the University of Zurich[8] prove that trichomonas infection is transmitted primarily through the male which, once infected, remains infected for life, if not properly treated. Therefore, all bulls must be thoroughly examined. Infection can be detected easily with the help of a culture medium consisting of streptomycin and penicillin in serum-bouillon.

It was found that the infective microorganisms grow on the surface of the mucous membrane of the penis and prepuce and must be treated by intensive spraying with a disinfectant prepared from 1,000 cc. hydrogen peroxide (30% strength), 6,500 cc. distilled water, and 15 cc. tinovetin NR(Geigy); the latter, a mucus dissolving agent, may be omitted if not available. The spray is applied at 40 C. with 4.5 atmospheric pressure. Half an hour before the treatment is given, a pint of the spray solution is injected into the prepucal sac and left in it for five minutes. During this period, the sac is massaged. Two injections are given, each consisting of 20 cc. procaine (2%) in epinephrine solution—one in the center of the sac, the other 5 inches behind the prepuce opening.

All 100 bulls so treated were cured. Before each coition, proper sanitation of the animals is necessary to avoid reinfection. Irrigation of the urethra or parenteral or enteral therapy is not necessary.—*R. S.*

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Estrogens Increase Feed Utilization and Weight Gain of Swine

Subcutaneous implantation of 80 mg. of a synthetic estrogen preparation into four castrated boars[9] did not bring about marked gains in weight after 64 days. However, four sows so treated made weight gains averaging 6.13%, or 31 lb. Cyclical heat symptoms were suppressed for more than 17 weeks.—*R. S.*

[8]Hess, E., Diagnose und Therapie der Trichomonadenseuche beim Zuchtstier. *Tierärztl. Umschau*, 6:191 (June), 1951.

[9]Trautmann, A., and Moch, R., Zur Frage der Hormonalen Beeinflussung des Fettansatzes beim Schwein durch Oestrogene. *Tierarztl. Umschau*, 6:121 (Apr.), 1951.

Observations on the Use of H. P. Vehicle

J. L. McAULIFF, D.V.M., W. V. PHILLIPS, D.V.M., and J. R. STEELE, D.V.M., Cortland, New York

The authors have used numerous water-in-oil emulsions as vehicles for various antibiotics during the past four or five years for treatment of bovine mastitis and uterine infections. Since July 1950, a product known as H. P. vehicle® has been used and is now believed to be the most satisfactory of all agents tried up to this time.

H. P. vehicle is stated to be an emulsion of neutral pH, consisting of anhydrous lanolin, cholesterols and sterols of animal tissue origin, refined mineral oil, distilled water, preservative and citrate buffer. It is homogenized, having a viscosity light enough so that aqueous antibiotics are easily mixed in it. Due to the neutral pH and stability of the product, antibiotics will remain effective longer and may be added for greater concentration than in either strongly acid or strongly alkaline vehicles.

During the past 15 months over 6,000 quarters have been treated with H. P. vehicle. The most satisfactory mixture has been of crystalline (not procaine) penicillin G and dihydrostreptomycin. The antibiotics are dissolved in a few cubic centimeters of distilled water, injected directly into the vehicle and the mixture thoroughly shaken. The mixture is kept refrigerated when not in use and none is kept longer than a day or two.

Treatment of Mastitis

In chronic cases involving *Streptococcus agalactiae* and *Str. dysgalactiae*, 200,000 units of crystalline penicillin G and 0.2 gm. dihydrostreptomycin are added to 20 cc. of vehicle and infused into the affected gland. This treatment is repeated in 48 hours. In acute cases, the dosage is increased, depending upon the severity, to 500,000 units of crystalline penicillin G and 1 gm. of dihydrostreptomycin. Treatment is repeated at 24-hour intervals, using the same dosage as recommended for chronic cases. Where *Bacillus coli* or Staphylococcus infection are suspected, 1 gm. of dihydrostreptomycin, with 500,000 units of penicillin G, is the minimum dose employed.

®Hamilton Pharmacal Co., Inc., Hamilton, N. Y.

Results in Mastitis

In acute and chronic mastitis, results show a recovery rate of 90% or better. Recovery was checked either by physical examinations of the milk or by taking milk samples in numerous herds operating under the New York State Mastitis Control Program. At least 4,000 quarters were checked culturally before and after treatment. No cases of vehicle irritation were noted in any of the quarters treated.

Uterine Infections

For uterine use, 1,000,000 units of crystalline penicillin G and 1 gm. of dihydrostreptomycin are dissolved in distilled water and mixed with 100 cc. of H. P. vehicle. Shake vigorously. In treating cases of endometritis or cervicitis, 20 to 40 cc. of the mixture are injected directly into the uterus. The amount used is increased in proportion to the severity of the infection. Two hundred such cases have been treated in this manner.

As an experiment, the antibiotic-vehicle mixture was injected into the uteri of cows destined for the abattoir. Autopsy, 24 hours after injection, revealed that these were entirely coated with the emulsion. This observation indicates the spreading effect produced by the vehicle.

Results in Sterility

Results in sterility work have been excellent. Cultural attempts on pretreatment samples obtained from uteri have failed to disclose pathogenic organisms because of heavy seeding of contaminants. Eighty-five per cent of those cows treated bred on first service.

Conclusions

Experience with crystalline penicillin G and dihydrostreptomycin mixed in H. P. vehicle has been satisfactory for chronic mastitis and has proved equally useful in acute mastitis. In addition, the antibiotic-vehicle mixture has been found to be effective in a limited number of cows exhibiting symptoms of endometritis and cervicitis. It is believed the excellent results observed and recorded are partially due to the stability of the antibiotics in the buffered, nonirritating vehicle. Sulfamerazine incorporated into the mixture (1 to 2 gm. per 20 cc.) did not appear to improve its efficacy.

Postvaccination Gut Edema

W. L. SCHONDELMEYER, D. V. M.,
Independence, Missouri

On November 8, 1951, the writer vaccinated 81 Poland China-Berkshire-cross pigs with hog cholera antiserum and virus. These pigs ranged in weight between 40 and 75 lb. General health and condition were good. The average dose of serum was 35 cc. and virus, 2 cc. These animals were on a ration of shell corn and a 40% protein supplement, fed free choice. A daily addition of approximately 25 gal. of skim milk supplemented the self-feeder ration.

First deaths (two) occurred on the fourth day after vaccination. Four pigs died on the sixth day, two on the seventh day, and one on the ninth postvaccination day. There was a total death loss of nine in the entire drove.

Symptoms

The owner called on the morning of the sixth day following vaccination. Six pigs had been found dead around the house or feeders. Deaths were sudden, without noticeable symptoms.

On examination of the drove, edema of the face, jowls, and eyelids was observed in most of the pigs in the lot. There were four that had such a pronounced edema of the sclero-conjunctival junction that conjunctiva appeared to protrude between the lids. There were a few pigs that showed some incoordination in gait. Most were at the feeders at the time of examination and when approached would scurry about. Temperatures were taken on approximately ten head and were noted to range between 103 and 105 F.

Autopsy Findings

Autopsy findings were as follows: Most conspicuous lesion present in all pigs posted was that the coils of the colon were embedded in a jelly-like mold and were moist and glistening. The stomachs of all those examined were apparently normal and full of feed. The small intestines showed few lesions except for what appeared to be Salmonella infection in two animals. Livers and spleens were essentially normal, but the capsule of the kidney seemed to peel off easier than from a normal kidney. There was marked edema of the submaxillary and adjacent lymph nodes and also the inguinal nodes. The peritoneal, pleural cavities, and pericardial sac contained from slight to moderate amounts of transudates.

Treatment and Conclusions

The owner was instructed to remove the shelled corn and supplement, which were replaced by oats and skim milk. All animals were given an additional 20 cc. of hog cholera antiserum. For six days, sufficient sodium arsanilate was added to the drinking water so that each gallon contained 2.2 gr. of elemental arsenic.

Postvaccination gut edema in this drove caused death loss, and most marked symptoms in the youngest pigs. Symptoms were most pronounced on the sixth day after vaccination. While the specific cause of gut edema has not been established, in this case it appears the serum and virus might have been the precipitating factor.

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Testicular Neoplasms—Report of Two Cases

KENNETH B. HAAS,* D.V.M., and ANTHONY MILAKNIS,* D.V.M., Chicago, Illinois

The spermatogonial, supporting, and interstitial cells in the testes of elderly dogs tend to undergo nodular hyperplasia and dedifferentiate into neoplastic forms. These cell types constitute the basic three testicular neoplasms, termed: seminoma, supporting-cell tumor (sustentacular or Sertoli), and interstitial-cell tumor. This report is concerned with the introtubular seminoma and supporting-cell tumor as observed in two recent cases.

The cases were uniform in that both showed unilateral, painless, slowly growing, testicular enlargement, attended by some senescence. Surgery was suggested in both cases and bilateral orchidectomy consequently performed. The approach was made at the anterior-displacement area of the enlarged testes in the low-abdominal region. Removal was routine; bleeding minimal. As much tissue was removed from the scrotum as possible. External suturing was with nylon. Hormone therapy was not instigated in either case.

Case 1. A 5½-year-old, male, Terrier-type dog. The enlarged testicle was easily palpated. Anesthesia was induced with intravenous pentobarbital sodium to effect. Macroscopically the testis was enlarged, avascular, internally lobulated. Microscopic examination† revealed neoplastic tubular epithelium formed into solid nodules resembling seminiferous tubules. It appeared invasive, malignant, non-metastatic. Diagnosis: seminoma.

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*Member of staff, Christensen Animal Hospitals.

Case 2. A 12-year-old, male Chow. The testicle was greatly enlarged, the scrotum pendulant. The opposite testis was atrophic to a high degree. Anesthesia was accomplished by giving preanesthetic morphine sulfate and atropine followed by infiltration of the surgical site with procaine hydrochloride. The testis was enlarged and relatively vascular. The atrophic testicle was very small and hardened. Sectioning† revealed signs of aspermia, senility, and induration in the smaller testis, while the neoplastic one showed large irregular spaces filled with branching Sertoli cells and no normal spermatogonium. It was considered malignant. Diagnosis: Sertoli-cell tumor.

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Diethylstilbestrol in Nonbreeding Does

G. W. BAYLES, D.V.M., Marion, Illinois

One of the problems of the rabbit industry is the nonbreeding doe.

A domestic rabbit raiser recently presented an example of this problem. He was employed part time and was supplementing his income with what he could raise from 50 New Zealand does. These females had quit accepting the buck entirely. It was costing the owner several dollars each month to feed and with no young fryers to sell, he was going into the red fast.

Each doe was injected with 0.25 to 0.5 cc. of stilbestrol in oil (each cc. containing 4 mg. of the synthetic estrogen). Every doe given this solution accepted the buck within 24 hours and conceived by the service. To date, 15 does have delivered young and the owner is now back in business.

Needless to say, the writer was as pleased as the owner with the results obtained.

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Minnesota Veterinary Short Course

Staff members of the School of Veterinary Medicine, University of Minnesota, presented an informative program on cattle practice problems, supplemented by clinical demonstrations, during sessions of the veterinary short course held at St. Paul, October 25-26, 1951. Meetings and demonstrations were held in the new clinic building.

Dr. W. R. Prichard reported studies on soy bean meal poisoning as observed on several Minnesota farms. This report was supplemented with a film. Dr. J. P. Arnold presented the subject of teat surgery, illustrated with schematic slides. He emphasized that on farms where general sanitary conditions were unfavorable he had refused to operate. Dr. D. E. Bartlett covered the subject of and importance of pregnancy diagnosis ability in cattle practice. He provided an abundance of genital organs, obtained from packing houses, for his clinical discussions. Dr. B. S. Pomeroy handled the poultry disease control in a masterly fashion, again stressing that there is an opportunity for professional service in this field. An interesting film and clinical demonstrations were included.

Dr. R. L. West, state veterinarian, brought the group up to date on changes in the brucellosis program. Dr. W. R. Dreher of the Badgers Breeders Corp., one of the oldest organizations providing artificial insemination service, at Shawno, Wis., reported on the problems presented in their work.

Dr. H. R. Cox of Pearl River, N. Y., presented two scholarly addresses on viruses in general and the new approach to immunization through living foreign tissue adapted viruses, and outlined in brief reseach work supporting living viruses as now recommended for control of rabies, canine distemper, and hog cholera. Doctor Cox stated that losses following vaccination of pigs with lapinized hog cholera vaccine was negligible (one in 10,000). He also reported progress in adaptation of human poliomyelitis virus to foreign host.

The Minneapolis Tribune carried a picture of Dean W. L. Boyd of the School of Veterinary Medicine, reviewing his activities with Minnesota University and announcing his plans for retirement at the end of this college year.

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Dr. Karl M. Meyer, Hooper Foundation, University of California, is the recipient of the Lasher Award, presented by the American Public Health Service.

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A Comparison of Milk and Blood Serum Agglutination Tests

(*Continued from page 51*)

7. Morse, E. V., Pope, E. and Winner, W. R., Unpublished data, 1951.

8. Moore, T., The Brucella Abortus Ring Test., *Canad. Jour. Comp. Med.* (February):39, 1951.

9. King, N. B., Personal correspondence. 1951.

†Microscopic diagnosis by Dr. C. R. Cole, Department of Veterinary Pathology, College of Veterinary Medicine, Ohio State University, Columbus.

The Veterinarian's Bookshelf

Listed herewith are some of the newer and useful books of veterinary interest. These and any other books, if available, may be obtained by remitting the purchase price to the Book Department, VETERINARY MEDICINE, *Suite* 803 *Livestock Exchange Building, Kansas City* 15, *Mo. Books will be mailed postage prepaid anywhere in the United States only.*

Diseases and Practice

Bovine Mastitis—Ralph B. Little, *et al.*	$ 8.00
Diseases and Parasites of Poultry—E. H. Barger and L. E. Card	4.00
Diseases of Genital Organs of Domestic Animals—W. L. Williams	10.80
Diseases of the Pig and Its Husbandry—D. J. Anthony	4.00
Diseases of Poultry—H. E. Biester and L. H. Schwarte	10.50
Index of Diagnosis—Hamilton Kirk	8.00
Index of Treatment (new 2nd ed.)—Hamilton Kirk	8.00
Infectious Diseases of Domestic Animals—W. A. Hagan	8.00
May's Manual of Diseases of the Eye—Charles A. Perera	5.00
Practice of Veterinary Medicine, The—D. H. Udall	7.50
Radiology in Small Animal Practice—Gerry B. Schnelle	8.00
Veterinary Obstetrics (new)—Frank Benesch	9.50
Veterinary Obstetrics—W. L. Williams	8.10

Anatomy and Physiology

Anatomy of Domestic Animals—Sisson and Grossman	$14.50
Guide to the Dissection of the Dog—Malcolm E. Miller	5.00
Physiology of Domestic Animals—H. H. Dukes	7.50
Structure of the Fowl—O. Charock Bradley	4.00
Topographical Anatomy of the Dog—O. Charock Bradley	4.50

Pathology

Animal Pathology—Russell Runnels	$ 7.00
Brucellosis in Men and Animals—I. F. Huddleson	3.50
Manual of Veterinary Clinical Pathology—David L. Coffin	4.00
Neoplasms of the Dog—R. M. Mulligan	4.00
Pathology and Therapeutics of Diseases of Domestic Animals (3 vol.)—Hutyra, Marek, and Manninger	50.00

Animal Sanitation and Disease Control
SURGERY OF THE DOG
BRUCELLOSIS IN MAN AND ANIMALS
MANUAL OF VETERINARY BACTERIOLOGY
VETERINARY PHARMACOLOGY MATERIA MEDICA, and THERAPEUTICS
THE PHYSIOLOGY OF DOMESTIC ANIMALS
VETERINARY SURGERY NOTES — L. E. EAGE
DISEASES of POULTRY
DISEASES OF THE SMALL DOMESTIC ANIMALS
THE PRACTICE OF VETERINARY MEDICINE
INDEX OF DIAGNOSIS
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Parasitology

Veterinary Clinical Parasitology—E. A. Benbrook and Margaret Sloss	$ 4.50
Veterinary Helminthology—Morgan and Hawkins	6.00
Veterinary Helminthology and Entomology—H. O. Monnig	6.50
Veterinary Protozoology—Morgan and Hawkins	4.00

Nutrition

Animal Nutrition—L. A. Maynard	$ 5.50
Avitaminoses, The—Eddy and Dalldorf	4.50
Essentials of Nutrition—H. C. Sherman and C. S. Lanford	4.25
Feeding Our Dogs—Leon Whitney	3.50
Feeding Poultry—G. F. Heuser	4.50
Feeds and Feeding—Henry and Morrison	7.00
Nutrition of the Dog—Clive McCay	3.50
Poultry Nutrition—W. R. Ewing	12.50
Vitamin B Complex—F. A. Robinson	9.00

Public Health and Hygiene

Animal Hygiene—Leunis Van Es	$ 7.50
Meat and Meat Foods—L. B. Jensen	3.75
Meat Hygiene—A. R. Miller	7.50
Public Health and Hygiene—Charles Boldman	4.25
Textbook of Meat Inspection—Horace Thornton	12.50

Surgery

Animal Castration—George R. White	$ 7.50
Canine Surgery—H. P. Hoskins and J. V. Lacroix	12.00
Dollar's Veterinary Surgery (new)—J. J. O'Connor	11.00
Experimental Surgery—J. Markowitz	7.00
Surgical Principles and Technics (new text)—W. F. Guard	5.50
Veterinary Surgery Notes—E. R. Frank	5.00
Williams' Surgical Operations—A. G. Danks	2.50

Bacteriology

Manual of Veterinary Bacteriology—R. Kelser and H. Schoening	$ 6.50
Veterinary Bacteriology and Virology—I. A. Merchant	8.50

Diagnosis

Diagnostic Methods in Veterinaary Medicine—George F. Boddie	$ 5.00
Principles of Hematology—Russell L. Haden	5.00

Dictionaries

American Illustrated Medical Dictionary—W. A. Dorland	$ 8.50
Blakiston's New Gould Medical Dictionary—	9.50
Stedman's Practical Medical Dictionary—Stanley Garber	8.50

Miscellaneous

Animal Breeding—A. L. Hagedoorn	$ 5.00
Animal Sanitation and Disease Control—R. R. Dykstra	3.50
Cancer As I See It—Henry W. Abelmann	2.75
Care and Breeding of Laboratory Animals—Edmond J. Farris	8.00
Circus Doctor—J. Y. Henderson	3.50
Complete Book of Home Pet Care, The—Leon Whitney	4.95
Diseases Transmitted from Animals to Man—Thomas G. Hull	11.00
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ITEMS OF VETERINARY INTEREST

Human brucellosis might be eliminated as an occupational disease if all infected animals were removed from herds and droves.

▼

Bob Hope, nationally known comedian of screen, stage, radio, and television, has accepted the general chairmanship for 1952 of the National Dog Welfare Guild.

▼

Frequency of lesions of avian tuberculosis found on slaughter of swine indicates that incidence of this disease in hogs has not been reduced in the proportion that it has in cattle.

▼

Tetanus, killer of battle casualties, was responsible for only three deaths among United States military personnel during World War II. All soldiers were inoculated according to prescribed methods with tetanus toxoid.

▼

Ten years ago the selling price of slaughter classes of cattle and hogs differed on an average of $1. to $1.50. A differential of approximately $17. per cwt. between choice steers and hogs was posted at the Chicago market last month.

There were more meat animals slaughtered in California in October 1951 than in Illinois.

▼

A total of approximately 16% of the dairy cows in the United States are now enrolled in artificial insemination associations.

▼

American virus of myxomatosis of rabbits is being used to infect wild rabbits of Australia as an effort in the control of these pests.—*S. N. L.*

▼

Vesicular exanthema is fairly common on California hog ranches. This disease is clinically indistinguishable from foot-and-mouth disease.

▼

The flight range of the common house fly is reported to be eight miles or more although movement of the majority is restricted to within one mile limits.

▼

Six of seven prominent dairymen state that proper milking practices are the most important factors in mastitis control in their respective herds.—*Hoard's Dairyman.*

Speyer Hospital Mobile Clinic

Illustrated is an interior view of the new mobile clinic of the Allan Prince Speyer Hospital, League for Animals, New York City. This mobile clinic is built on a 1½ ton Dodge route-van truck equipped with x-ray apparatus, microscope, instrument cabinet, sterilizers, refrigerator, instruments and supplies, for rendering emergency veterinary service in low income neighborhoods of New York City. Dr. Cherry Ann Hooper, clinician in charge of the mobile unit, is a member of the professional staff of the hospital.